# WYOMING QUARTERLY UPDATE

FALL 1990

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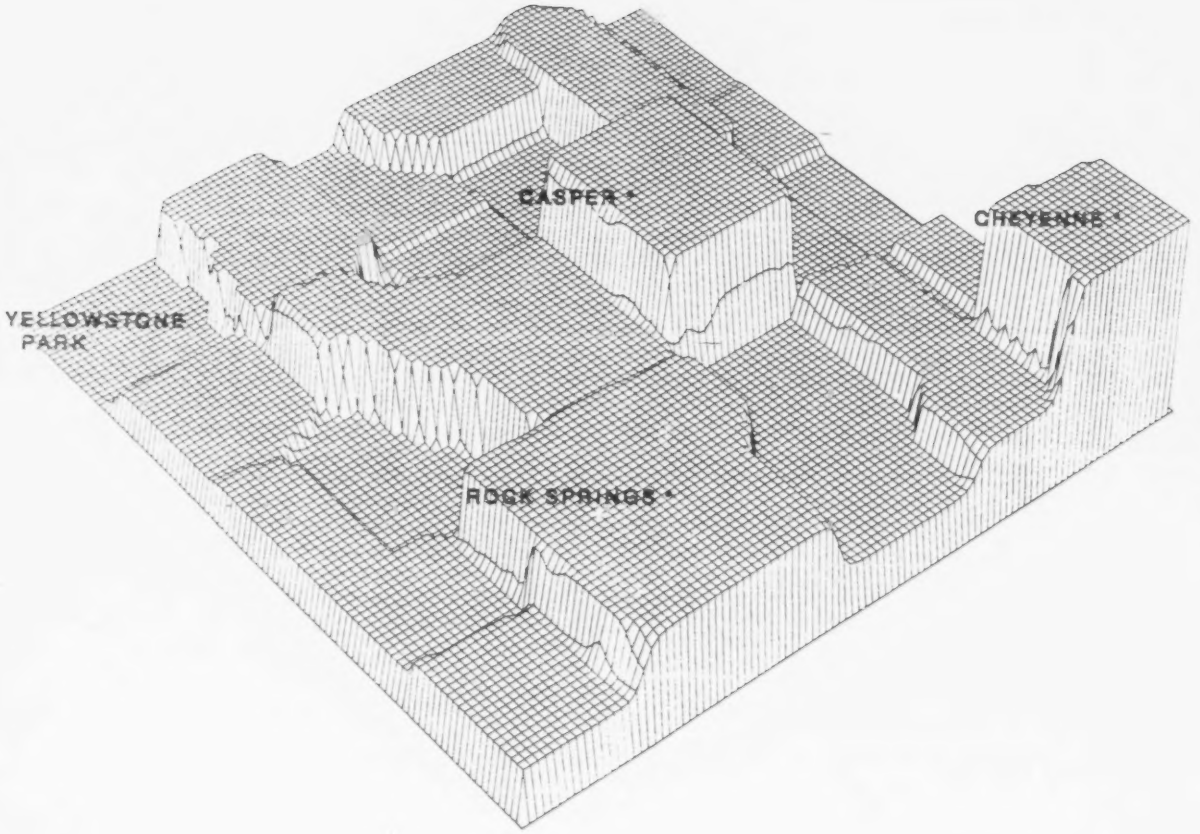
UNIVERSITY OF WYOMING

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SURVEY RESEARCH CENTER

## PRELIMINARY 1990 CENSUS RESULTS

SURVEY RESEARCH CENTER
DEPARTMENT OF POLITICAL SCIENCE
UNIVERSITY OF WYOMING

## Wyoming Quarterly Update

Wyoming Quarterly Update (WQU) represents the efforts of the Survey Research Center at the University of Wyoming to provide improved data access services. The data presented in WQU are assembled from secondary sources, such as government agencies and private industry. The staff of SRC greatly appreciates the ongoing, helpful cooperation of each of the data sources.

WQU provides current indicators and timely, easily accessible data. Most of the data published in WQU are updated quarterly with the most current numbers. The complete data sets from which WQU originates are maintained, together with documentation by SRC. Readers are encouraged to contact the Center to find out how to gain access to data which do not appear in the WQU. Many data series, such as gasoline sales and taxation data, span more than 30 years. Numerous other series cover 20 years or more.

The cover of each edition features a contour map illustrating the geographic distribution of a particular variable. This edition presents the Preliminary 1990 Census results for Wyoming counties. These figures are subject to evaluation by state, county, and city officials and will probably change before they are given to the President in December. The figures will then be used for reallocation of Congressional Districts. For more information using these 1990 Preliminary figures, see the divider pages of this issue.

| County | Population | County | Population | County | Population |
|---|---|---|---|---|---|
| Albany | 30,496 | Hot Springs | 4,794 | Sheridan | 23,527 |
| Big Horn | 10,462 | Johnson | 6,129 | Sublette | 4,836 |
| Campbell | 29,190 | Laramie | 72,319 | Sweetwater | 38,567 |
| Carbon | 16,629 | Lincoln | 12,514 | Teton | 10,631 |
| Converse | 11,100 | Natrona | 60,962 | Uinta | 18,624 |
| Crook | 5,277 | Niobrara | 2,488 | Washakie | 8,321 |
| Fremont | 33,342 | Park | 22,727 | Weston | 6,514 |
| Goshen | 12,319 | Platte | 8,137 | Yellowstone | 0 |

First-time readers of WQU should refer to the "format" explanations on page 62 for keys on how best to use and interpret data presented in this publication.

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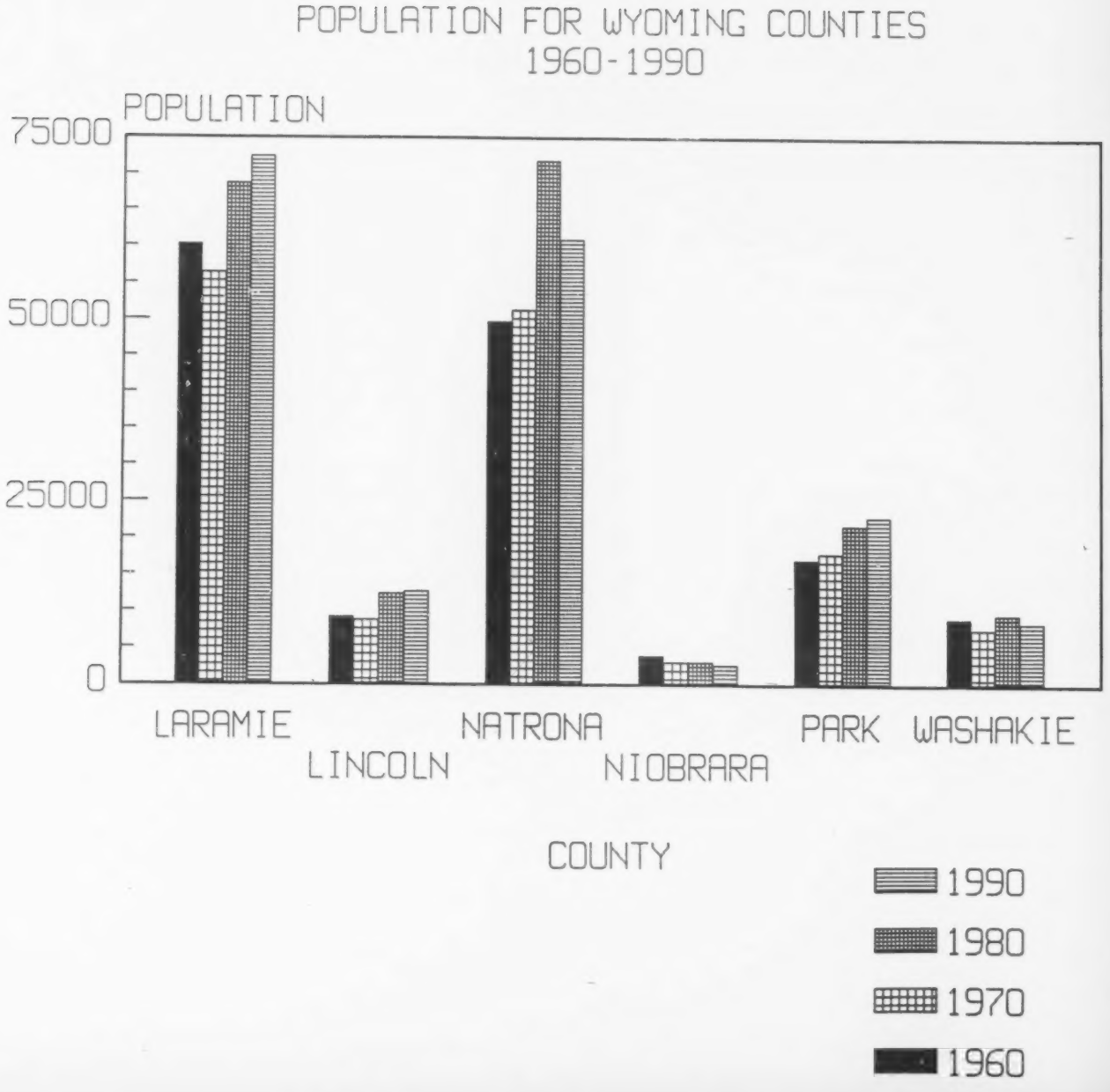
POPULATION FOR WYOMING COUNTIES
1960-1990
POPULATION
75000
50000
25000
0
LARAMIE
LINCOLN
NATRONA
NIOBRARA
PARK
WASHAKIE
COUNTY
1990
1980
1970
1960

# Overview and Perspectives

With the snow flying outside it's hard to think about the summer tourist season, but Wyoming had a great Centennial summer.

Visitations to Yellowstone, Grand Tetons, Devil's Tower, Fossil Butte, Fort Laramie, and the Big Horns were all up from 3rd quarter a year ago. In fact, the Wyoming Travel Commission reported Wyoming led the Rocky Mountain Region in an increase in summer tourism and the Rocky Mountain Region was the only region to post an increase in tourism nationally. The commission attributed this boost in tourism to the centennial year celebrations and a growth in the advertising budget which enabled the commission to put together some effective ad campaigns.

Aided by the banner tourist season, Teton County had record setting unemployment rates for the 3rd quarter of 1990. With .7%, .6%, and 1.7% respectively, Teton County had the lowest unemployment rate of all Wyoming counties for July, August, and September, making it 5 months in a row Teton County took these honors. Counties with the highest unemployment rates were not as consistent with Sweetwater County in July (5.1%), Big Horn County in August (7.1%), and Converse County in September (6.7%) claiming the highest rates. The September U.S. seasonally adjusted unemployment rate of 5.7% was the highest unemployment rate since February 1988. For Wyoming, a 5.4% seasonally adjusted rate was below the national rate and well below the 6.9% of a year ago.

The Bureau of Economic Analysis reported a slow down in the growth of personal income for the U.S. in the 2nd quarter of 1990. Personal income for the nation increased only 1.3% compared to an increase of 2.1% for the 1st quarter. However, personal income growth increased slightly in the Rocky Mountain Region (See graph on next page). Total personal income in Wyoming rose to 7,223 (millions of dollars, seasonally adjusted at annual rates), up from 7,144 for the 1st quarter of 1990. The largest percent change in personal income came in the mining industry with a 3% increase from 1st quarter 1990 to 2nd quarter 1990. (Nationally, the biggest increase was also seen in the mining industry). State personal income for 3rd quarter 1990 will be released in late January.

Business conditions had a strong showing in the 3rd quarter of 1990 with the number of new corporations up and the number of personal and business bankruptcies down. The number of new corporations, at 567, was up from a 3rd quarter 1989 total of 432.

The Division of Research and Statistics recently published their Biannual Cost of Living Report for the 2nd quarter 1990. The report indicated that Jackson ranked number 1 in comparative cost of living with an all item index value of 126.03 (statewide average = 100). It was followed by Cheyenne at 104.28, Gillette at 103.76, Laramie at 103.00, Rock Springs at 100.68, and Cody at 100.18. All other communities surveyed had indexes below the statewide average of 100.

## Preview of Coming Attractions

- The expansion of the Green River Tenneco Minerals Company is estimated to provide 160 new permanent jobs and 374 construction jobs. The Green River Star reported that Green River will gain $580,000 per year in sales and use tax, and an additional $425 million in ad valorem taxes.

- A German owned company has applied for a permit for uranium mining in the southwestern portion of Campbell County. The mine would not be operational until late 1991 or early 1992.

## Terry's Trivia

From the second quarter of 1989 to second quarter 1990 the average rental rates for a two or three bedroom single family house in Jackson rose from $475.00 to $716.29. This was a 50.8% increase and excludes gas and electricity.
(Source: Biannual Wyoming Cost of Living Report, June 1990, DAFC Research and Statistics Division.)

Terry Haven
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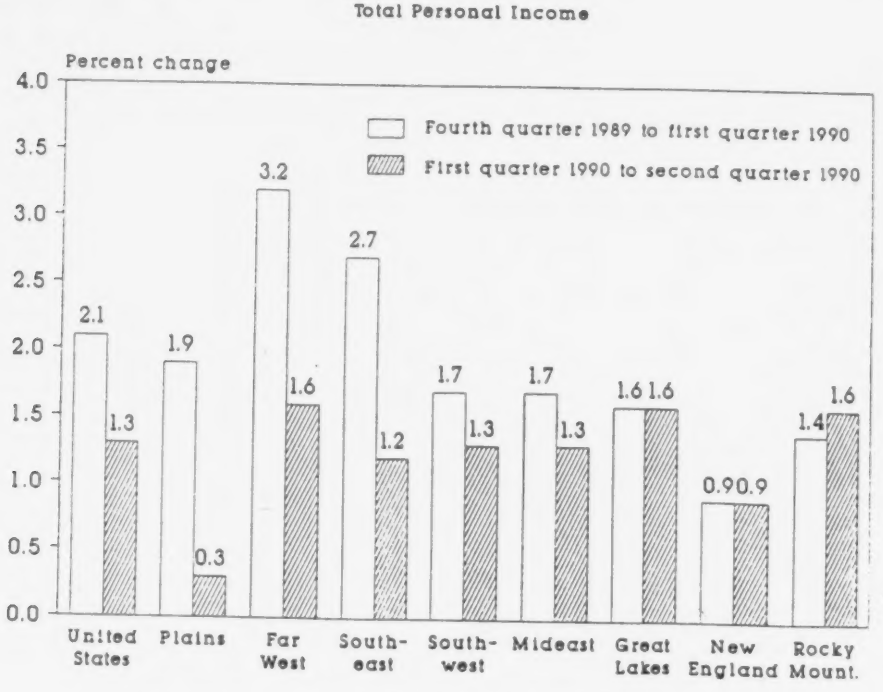


Source: U.S. Department of Commerce
Bureau of Economic Analysis

# Fall Minerals Update

## OVERVIEW

How fast things change when the Middle East is involved! The invasion of Kuwait, coupled with the United Nations' trade embargo of Iraq and the United States' "energy policy", which has allowed oil imports to exceed 50 percent of the Nation's daily requirements, have all combined to drive oil prices to their highest level since the last energy crisis. For example, oil futures were pushing $40 a barrel in late September.

Although rapid and large swings in the price of oil are going to continue under any Middle East scenario, the bottom line is that the 4 million barrels of daily production attributable to Iraq and Kuwait are being made up by other producers. High prices for oil futures are coming from investors that are betting on an open war in which production from some of Iraq's neighbors are interrupted. We can all pray this does not happen.

Last quarter we were forecasting the posted price of oil at $17 a barrel. Now the average posted price for Wyoming crude looks more like it will be $22 a barrel in 1990. For the next several years, we are forecasting the average posted price at $25 per barrel. After gravity adjustments, these posted prices translate into a first purchase price of $20 and $23, respectively (Table 1).

The recent higher prices for oil are not likely to stimulate oil exploration because the prices are still too volatile to attract much capital. Wyoming should; however, see some previously marginal stripper wells continue to produce and some others come back on production. There is also optimism that some tertiary and enhanced oil recovery projects that were shelved when prices were low might be dusted off and activated. Also the huff n' puff carbon dioxide process for enhanced oil recovery seems like a natural to take advantage of fluctuating changes in price.

Stripper and tertiary production are each projected to increase by about 500,000 barrels a year through 1994. With these things in mind, we have slightly increased our forecast of oil production for the next several years (Table 2). Oil production; however, is still expected to decline by about 2 percent a year.

The real excitement in the oil patch of Wyoming (other than improved prices) is still the Niobrara play in the southeastern part of the State. Two horizontally-drilled holes in the Niobrara have come in at 2,000 and 1,462 barrels of oil per day, respectively. The newest well looks capable of sustained production over 500 barrels per day. While other horizontal wells are planned in this Niobrara play, companies are also looking at the Niobrara in other parts of the State as well as at other formations that might be equally good targets for this drilling technique.

The Middle East crisis is not really affecting the natural gas and coal markets yet. Obviously, if oil prices stay up long enough, there may be some effect as energy users look for less interruptable as well as less expensive fuels. The driving forces in the growing demands for natural gas and coal; however, precede the crisis in the Middle East.

In the case of natural gas, the demand is finally catching up with the supply. The price has apparently bottomed out at about $1.64 per MCF and should increase at about 10 percent a year at least through 1994 (Table 1). Production, which has been going up each year, will continue to increase about 2 percent a year until 1992 when a Wyoming to California pipeline should boost production at least an extra 90 million MCF and possibly more (Table 2). Although the likelihood of a pipeline being built increases each quarter, it is still unclear whether it will be built by Kern River or Wycal. Since both companies have ordered materials, there is also the possibility that two pipelines will be built.

Interest in coalbed methane has not slackened as more and more projects have been announced. There are now coalbed methane plays in nearly every basin in Wyoming. It also appears that Congress may extend the tax incentives for this kind of unconventional gas play.

Coal production is expected to continue increasing at slightly less than 5 percent a year at least through 1994. By then the effect of the new Clean Air Act ought to be noticeable. Since the act contains provisions for utilities to burn low-sulfur coal, Wyoming coal producers should see some additional markets open up. However, because of the way the new standards are phased in, it is likely to be a number of years before there is significant new demand. Our forecast for coal production in Table 2 is now somewhat higher than it was last quarter.

While new coal prices are not really coming down, the average price paid for Wyoming coal is projected to decrease 3-5 percent a year (Table 1). This is because more and more spot coal, new contracts, and renegotiated contracts are in the range of $3.50 to $5.00 a ton. When these increasing quantities of low-priced coal are averaged with the older and higher-priced contract coal, the overall average value goes down. Low-priced coal ($3.50-$5.00), which only accounted for 6 percent of Wyoming's production in 1985, is estimated at 24 percent in 1990 and could be over 50 percent by 1995. Overcapacity is still the problem creating low coal prices. But there is an obvious bright side to overcapacity. When demand does increase substantially, Wyoming mines can supply those demands and quickly.

While it is obvious that things are continuing to improve for oil, gas, and coal industries of the State, there is also some good news in the uranium industry. Production of uranium from both conventional open pit mining and from in-situ (solution-mining) recovery methods are both expected to increase over the next 5 years (Table 2). These increases ar related to the depletion of domestic uranium stockpiles. And prices are also forecast to increase (Table 2).

In non-fuel minerals, trona has the spotlight. All five trona-mining companies have either recently expanded, are expanding, or are planning to expand their refineries and product facilities. There is a mini-boom in southwestern Wyoming with all this construction.

In the third quarter of 1990, interest in gold, copper, aggregate, limestone, decorative stone, and silica continued. In addition there were inquiries about diatomite and vermiculite deposits in Wyoming.

Gary B. Glass
State Geologist
Geological Survey of Wyoming

## OIL AND GAS UPDATE

In July, posted prices for Wyoming Sweet crude oil were predicted to average less than $17 a barrel in the third quarter of 1990. Iraq's invasion of Kuwait, however, changed all that. By late September, futures' prices were hovering around $40 a barrel, their highest level to date. Some experts predict that oil prices could go to $65 or more per barrel if war breaks out and Iraq destroys production and transportation facilities in key producing countries such as Saudi Arabia.

Closer to home, the posted price for Wyoming Sweet was over $30 a barrel for the last half of September and averaged $29 a barrel for the month. The average posted price in August was $25.55 per barrel. These prices contrast with July's pre-invasion average of $17.05 a barrel. For comparison, the average price Wyoming oil producers actually receive for their oil (after gravity adjustments) is about $2 less than the posted price.

The Wyoming rig count has not yet responded to the higher oil prices. Companies are apparently waiting to see if prices will remain at their present levels before they commit to more exploration and production drilling. Many companies are also not prepared to accelerate their exploration activities because the low, fluctuating prices of the past several years left them with very small professional staffs. For similar reasons, there is also a shortage of rigs and trained drilling personnel.

In the last quarter, one thing happened that could help improve domestic oil exploration during this new energy crisis. In a recently released document, the U. S. Forest Service called for easing environmental regulations for oil and gas leases in National Forests. The proposal calls for reevaluation of environmental review procedures in 40 environmental impact statements. Five of these statements concern leases in Wyoming.

In regard to natural gas activities, Kern River Gas Transmission Co. awarded purchase orders for compressor units and valves for its natural gas pipeline from Wyoming to California. Wyoming-California Pipeline Co. (WyCal) also ordered compressor units and contracted for engines to power the compressors for their Wyoming to California pipeline. It is almost certain that one of these pipelines will be built, but it is still uncertain which will be built or if both will be built.

The Wyoming Oil and Gas Conservation Commission's final production figures for 1989 show that Wyoming produced 109.1 million barrels of oil and a record 866 billion cubic feet of gas. The top 25 oil fields in the State produced 53 percent of Wyoming's oil in 1989. A good share of the oil from these fields was discovered many years ago; however, 10 of the 25 largest fields were discovered after 1970. The top 25 gas fields in Wyoming produced 74 percent of the State's gas in 1989. In contrast to oil, most of this gas came from fields discovered after 1970, and the average year of discovery for the top five fields is 1980.

Even though Wyoming's 1989 gas production increased by 53.6 billion cubic feet over 1988's production, the average price Wyoming producers received in 1989 declined about 10 cents. The spot price remained below the average sales price except during the last part of the year when a very cold winter drove up demand and spot prices. The higher average price of crude oil, however,

should increase both the demand and the price for natural gas to some extent.

Although the State Land and Farm Loan Office's July sale did not generate as much revenue as their later September sale, it was still a relatively good sale in terms of the number of tracts and acres leased. This sale took place before the crisis in the Middle East and before oil prices shot up. Paul Sawyer made the high per-acre bid of $60 for a 40-acre lease in NE NE section 21, T32N., R82W. The lease is in the Wind River Basin and is approximately two miles southwest of Frontier, Muddy, and Lakota oil production at Iron Creek Field. Contex Energy made the second highest bid of $58 per acre for a 640-acre parcel covering section 16, T14N, R64W. The lease is six miles north of the horizontal-drilling pay in the Niobrara Formation in Silo Field in southeastern Wyoming. Several other tracts were leased in this area to test the Niobrara.

The State Land and Farm Loan Office's September sale sold all 200 tracts that were put up for bid. This is the first sale that sold all offered tracts since the competitive bid procedure replaced simultaneous drawings in 1983. The revenue from this sale was the highest since the July, 1988 sale. The results of the sale are an encouraging sign that drilling activity may soon accelerate in Wyoming. The high per-acre bid at this sale was $240 by Kenneth Berry for a 200-acre parcel that includes W/2 NE, SE NE, and W/2 SE section 12, T52N, R70W. The lease is less than a mile southeast of Minnelusa oil production at C-H Field.

Acreage in southeastern Wyoming remained in demand because of the horizontal-drilling play in the Niobrara in that part of the State. Scott Airey made the second highest per-acre bid of $61 for a 40-acre lease in SW NE section 22, T23N, R66W. The parcel is a mile south of shut-in Niobrara oil production in Chugsprings Field. Airey was the successful bidder for two other leases in T23N, R66W. He paid $56 per acre for a 160-acre parcel covering NW section 22, and $55 per acre for a 650-acre tract covering S/2 section 21 and N/2 section 28.

The U.S. Bureau of Land Management's (BLM) early August sale was held just after Iraq's invasion of Kuwait and before oil prices rose substantially. The sale was still relatively good in terms of acres leased and total revenue. The high bid of $325 per acre was made by Andover Partners for a 370.64-acre tract, which covers various lots in sections 27 and 28, T53N, R69W, near Minnelusa oil production in Candy Draw Field. Marathon Oil paid $170 per acre for an 800-acre parcel which covers parts of sections 8, 9, and 24, T23N, R112W. The lease is in the area of Frontier gas production at Storm Shelter and Emigrant Springs Fields.

A sale of leases owned by Warren Livestock Co. was also held in August and drew $621,000. A total of 21 tracts covering 35,780 acres in Wyoming's Laramie county and Colorado's Larimer and Weld Counties were sold. William Colson made the high per-acre bid of $40 for a 1,916.48-acre parcel that covers all of sections 1, 11, and 12, T15N, R66W in Laramie County. The tract is approximately five miles west of Cowan Oil's successful horizontal test of the Niobrara in Silo Field. All the tracts leased are related to the Niobrara play in Wyoming and Colorado.

Based on company data and on information compiled and published by Petroleum Information, the following significant exploration and development

events occurred in Wyoming during the third quarter of 1990:

A. In western Wyoming, DEKALB Energy scheduled the first methane test of coal beds in the Upper Cretaceous Adaville Formation. The location is in SE NW section 36, T22N, R117W.

B. In southwestern Wyoming, WEXPRO Co. completed three new gas producers in Church Buttes Field. The 78 Church Buttes Unit well in SE NW section 26, T17N, R112W, flowed 3.6 million cubic feet of gas, three barrels of condensate, and eight barrels of water per day from the Frontier and Mowry commingled. The 82 Church Buttes Unit well in C NW section 28, T17N, R112W, was completed flowing 1.7 million cubic feet of gas per day from the Dakota. The 79 Church Buttes Unit well flowed 557,000 cubic feet of gas per day during a test in the Dakota. The company is ready to complete three more tests and is drilling another well in Church Buttes Field.

C. Texaco has plans to drill a horizontal test of the Dakota in Bruff Field in Sweetwater County. Plans are to drill a vertical hole in C SE section 26, T19N, R112W, run geophysical logs, and then drill the Dakota horizontally if results from the vertical hole are unsatisfactory.

D. Two more extension wells in Sugarloaf Butte Field were completed in Sweetwater County. Presidio Exploration completed the 33-35 UPRR well in SE NE section 35, T22N, R111W. The well is producing 290,000 cubic feet of gas and 200 barrels of oil per day from the Dakota based on the latest production figures. General Atlantic Resources completed the 25-1 Sugarloaf-UPRR well in NE SE section 25, T22N, R111W, flowing 1.3 million cubic feet of gas and 446 barrels of oil per day from the Dakota. A drillstem test of the Frontier recovered 1,176 feet of oil.

E. In other activity in Sweetwater County, Amoco Production completed the 1 State of Wyoming-AI well in SW NE section 16, T22N, R111W, flowing 1.6 million cubic feet of gas, 72 barrels of condensate, and 36 barrels of water per day from the Frontier. The well is about a mile west of the Legacy Field discovery, which produces oil and gas from the Dakota.

F. In the northcentral part of the Greater Green River Basin, Triton Oil and Gas Corp. plans to drill 94 wells to develop gas from coal beds in the Rock Springs Formation in T22N and T23N, R101W-R103W. Triton's plans to drill up to 48 wells during the last part of 1990 may be changed or postponed because the BLM decided to require an environmental impact statement. Fifty-seven of the 94 wells are planned on land administered by the BLM. Triton estimates that each well will produce 1,200-1,600 barrels of water initially, but that the water production will quickly drop to 200 barrels per day. If all 94 wells are drilled, up to 23 evaporation ponds could be required.

G. On the east flank of the Washakie Basin, Fuel Resources Development Co. (Fuelco) has staked 18 more new locations in sections 1, 2, 3, 4, 10, 11, and 12, T12N, R90W, and in sections 34 and 35, T13N, R90W, to test coal beds in the Almond Formation. Fuelco may drill up to 30 wells in this area. Four coalbed-methane wells drilled by Fuelco in sections 2 and 11, T12N, R90W are currently being evaluated.

H. John S. Wold completed the 4 Government-Hearney well in SW NE section 5, T31N, R94W, flowing one million cubic

feet of gas per day from the Lakota. The well is in Longs Creek Field, which produces from the Phosphoria. A well earlier this year also established production from the Frontier in this Fremont County Field.

I. TCF Inc. completed another Fort Union well in Fuller Reservoir Field in the Wind River Basin. The Conoco Federal 1-25 in NE NW section 25, T36N, R94W, was completed in 13 sandstone zones between 4,750 and 7,550 feet. The well flowed 4.1 million cubic feet of gas per day.

J. Unocal plans to expand their tertiary steam injection project at South Casper Creek Field in Natrona County. Projected incremental oil recovery for the expansion is 9.75 million barrels of oil. An additional 1.4 million barrels will be produced from existing steam injection activity. Total projected recovery for this project is 11.15 million barrels of oil.

K. Medallion Petroleum is producing gas and condensate from the Muddy Sandstone at an extension to Wallace Creek Field at the eastern end of the Wind River Basin. The 1 Wallace Creek well in SE SE section 21, T34N, R87W, produced an average of 855,000 cubic feet of gas per day during June, the last month for which production figures are available.

L. Louisiana Land and Exploration (LL&E) will drill the third Madison well on the Madden Deep Unit on the north edge of the Wind River Basin. The well is a proposed 24,500-foot test on the eastern end of the Madden anticline in SW NE section 12, T38N, R90W, and is eight to 10 miles east of two other wells, the 1-5 Bighorn in SW NW section 5, T38N, R90W, and the 2-3 Bighorn in NW SE section 3, T38N, R90W, which were completed in the Madison, flowing 20 million and 38 million cubic feet of gas per day, respectively. The company also announced plans to build a $50 million, 50 million cubic feet per day gas processing plant. The Madison gas is sour and the company estimates that 4.7 tons of sulfur will be recovered for each million cubic feet of gas the plant processes. If the plant runs at capacity, LL&E estimates it will produce 235 marketable tons of sulfur per day.

M. Two wells drilled by Unocal have been completed in the Muddy Sandstone on the southeastern flank of Five Mile Field in the Bighorn Basin. The 55A-J34 Worland Unit well produced an average of 17 barrels of oil and 753,000 cubic feet of gas during June. The well is in SW NE section 34, T49N, R93W. The 60-M34 Worland Unit well produced an average of 4 barrels of oil and 266,000 cubic feet of gas during June. The well is in SW SW section 34, T49N, R93W.

N. Also in the Bighorn Basin, Texaco Inc. completed a workover of an abandoned Tensleep Sandstone well in Whistle Creek Field., The 36-16 Whistle Creek Unit well in NE SW section 16, T56N, R98W, pumped 327 barrels of oil and 58 barrels of water per day from the Morrison Formation. Texaco plans to work over three other abandoned Tensleep producers in the field for completion in the Morrison.

O. Phillips Petroleum recovered 447 barrels of oil and five barrels of water during a one-day swab test of the Dinwoody-Phosphoria at their 39-2 Rose Creek-State Well in SW SW section 34, T49N, R103W in Rose Creek Field. Phillips has locations staked for two more wells in the area of northwestern Wyoming.

P. Exploration for coalbed methane continues in the Hanna Basin. Metfuel Inc. took over as operator of Anderman-Smith's wells and has cased one well and finished drilling another. The 11-1 UPRR-Palm Livestock well in the NE NW section 11, T23N, R81W, was cased and the 3-1 UPRR-Palm Livestock well in NE SE section 3, T23N, R81W was drilled as a 6,000-foot test of coals in the Ferris Formation. Three other locations have been staked in the area.

Q. Texaco staked a location for a 1,500-foot test of coal beds in the Wasatch Formation on the western side of the Powder River Basin. The 1 Texaco-Lott-Fee well will be drilled in SE SE section 13, T52N, R83W.

R. On the eastern edge of the Powder River Basin, McAdams, Roux, and Associates completed two new Minnelusa producers in Cambridge Field. The 32-28 Cambridge-Plains-Federal well in SW NE section 28, T53N, R68W, pumped 474 barrels of oil per day. The 21-28 Plains-Federal in NE NW section 28, T53N, R68W, pumped 111 barrels of oil per day.

S. In Campbell County, Caza Exploration discovered Railroad Bend Field when their 1-Burnor-State well in SE SW section 16, T48N, R70W, pumped 403 barrels of oil per day from the Minnelusa Formation. Caza is also testing their 1 Ripcord-State well in SW NW section 16, T47N, R70W, after recovery of 2,300 feet of gas-cut oil on a drillstem test of the Minnelusa.

T. DCD Inc. recently completed two shallow Fort Union coalbed methane producers south of Gillette. The 6-9 Linny well in SE NW section 9, T47N, R71W, flowed 108,000 cubic feet of gas daily from an interval between 169 and 242 feet. The 13-16 State well in SW SW section 16, T47N, R71W, flowed 30,000 cubic feet of gas per day from an interval between 275 and 340 feet. No water production was reported at either well.

U. Ampolex Inc. completed a Minnelusa discovery on the southwestern edge of the Minnelusa trend. Their 24-21 Wagensen Heirs well in SE SW section 21, T46N, R72W, Campbell County, pumped 271 barrels of oil and 75,000 cubic feet of gas daily. During the well's first month of production, it produced 5,177 barrels of oil.

V. LASMO Energy also completed a new Minnelusa discovery in Campbell County. Their 1-30 Appaloosa well in SW SW section 30, T45N, R72W, pumped 23 barrels of oil and 60 barrels of water per day through perforations between 12,309 and 12,321 feet. This well is one of the most southwesterly producers in the Minnelusa trend.

W. Harvey E. Yates proposed a horizontal test of Niobrara in the Powder River Basin. The well would have a surface location near the center of section 19, T44N, R71W. The Niobrara is around 9,000 feet deep in this area. A vertical Niobrara producer, completed in 1985 by First Energy Corp, in NE SE section 24, T44N, R72W, has produced over 32,000 barrels of oil from the Niobrara.

X. GLG Energy proposed the Si Tanka Federal Exploratory Unit which would cover 85 square miles in T38N-T41N, R77W and R78W on the eastern flank of Salt Creek and Teapot Dome Fields in Natrona County. The company proposes the evaluation of the Niobrara Formation with horizontal drilling. A secondary objective is the Carlile Shale. According to the company, over four million barrels of oil were produced from the Niobrara and Carlile at Salt Creek Field

between 1911 and 1957. There is currently production from the Niobrara at Teapot Dome Field. GLG plans to drill four obligation wells scattered throughout the unit.

Y. In the southwestern corner of the Powder River Basin, Kerr-McGee Corp. completed their 43-26 Derrick Draw-Federal well in NE SE section 26, T36N, R76W, to confirm their Derrick Draw Field discovery. The new well is currently shut in, but it produced a total of 12,416 barrels of oil and 10 million cubic feet of gas from the Muddy during 21 total days of production in April and May.

Z. Cowan Oil scheduled four more horizontal Niobrara tests in Silo Field of southeastern Wyoming. The company's first horizontal well, which was completed earlier this year in NW NE section 11, T15N, R65W, initially flowed 2,000 barrels of oil and 500,000 cubic feet of gas from the Niobrara. This well is reportedly capable of 500-600 barrels of oil per day on sustained production. The new tests will have surface locations in sections 20,21,22, and 29, T16N, R64W. Cowan is also drilling a horizontal well with a surface location in E/2 SE section 22, T16N, R64W. Union Pacific Resources has also staked two additional locations for horizontal Niobrara tests in the Silo Field area. The new locations are in NE NW section 5, T15N, R64W and section 12, T15N, R65W. In October, Union Pacific's earlier well, the 1H Antelope 9-11 in NW SE section 11, T15N, R64W came in at 1,462 barrels on a 21-hour test. At last report, this new well looked like it would be capable of producing at 500-600 barrels of oil per day.

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## COAL UPDATE

Wyoming's coal production for 1990 appears to be headed for another record. Coal deliveries for the first half of this year were about 5 million tons (or 6 percent) ahead of those recorded for the first half of last year. Accordingly, our previous forecast has been revised upward to 179.2 million tons for 1990. This represents a total increase of slightly less than 5 percent over 1989's production. Coal production in the Powder River Coal Field (Campbell, Converse, and Sheridan counties) is expected to increase about 5 percent each year from 1990 through 1995. Southern Wyoming counties will show slight increases from 1990 through 1992 and then level off or decrease slightly from 1993 to 1995. By 1993, the State's coal production will exceed 200 million tons per year.

Much of the forecasted production increases are directly related to increases in the amount of low-priced coal (under $5.00 per ton) sold on the spot market, through short-term contracts, or through renegotiated long-term contracts. For example, during the first half of 1989, about 6.1 million tons of spot coal alone was delivered to utilities. This amount of spot coal accounted for about 8 percent of all coal deliveries. During the first half of 1990, about 11.0 million tons of spot coal accounted for about 13 percent of all coal deliveries. The percentage of low-priced coal (including spot, short-term and renegotiated contract coal) will continue to increase at least through 1995. The prevailing spot coal prices ($3.50 - $4.50) appear to be controlling, to a large degree, the short-term contract prices as well as the long-term contract prices that are being renegotiated under price reopener clauses in the contracts.

As more and more Wyoming coal is sold for under $5.00 per ton, the average

price paid for the State's coal production will continue to decline. If the trend continues, the overall price of Wyoming coal could drop from the $8.63 a ton observed in 1989 to $6.99 a ton in 1994 (Table 1).

National coal production for 1990, recently estimated by the National Coal Association (NCA), is expected to exceed 1 billion tons for the first time ever. This is an increase of 22 million tons or about 2.3 percent more than that produced in 1989 and will mark the fourth consecutive year that national production has set a new record. The NCA predicted that the increase in electrical generation from 1989 to 1990 would be only 1.6 percent, as compared to the 2.7 percent increase recorded from 1988 to 1989, and that coal consumption for electrical generation would increase by 7 million tons in 1990. About 77 percent of the Nation's coal production is used to generate electricity. The NCA also reported that western coal production for the first third of 1990 was 11.7 percent greater than for the same period in 1989 and that by year's end, it could be about 397 million tons.

Additional data on Wyoming's 1989 coal production became available in the third quarter of 1990. According to the 1989 Annual Report of the State Land and Farm Loan Office, coal produced from State of Wyoming leases was at its lowest level in twelve years' the 1.7 million tons produced in 1989 was about half of that produced in 1988. In spite of the decline in production, the value of the coal produced on State leases increased from $36.5 million in 1988 to $39.6 million in 1989 and the royalties generated from the coal increased from $4.6 million to $5.1 million. The increases in royalties and value of State coal in 1989 were caused by a dramatic decline in coal production on State leases in Campbell County and an increase in production in Sweetwater County. The State coal in Campbell County had an average value of $4.92 a ton in 1989 while the State coal in Sweetwater County had an average value of $24.26 a ton. This caused the average value of coal from State leases to increase from $10.36 per ton in 1988 to $22.68 per ton in 1989.

According to one Government report, Federal coal produced in Wyoming in 1989 accounted for about 85 percent of the State's total production (Minerals Management Service, 1990). Private coal produced in the State accounted for 14 percent of the total and State-owned coal accounted for only one percent of the total. Federal coal produced in Wyoming in 1989 was slightly more than that reported in 1988, but it still accounted for almost 70 percent of the total 209.3 million tons of Federal coal reportedly produced in the United States. Production of Federal coal in 1989 accounted for 21 percent of the total coal production in the U.S. The Federal coal produced in Wyoming during the 1989 calendar year had a total market value of about $1.6 billion, an average value of $10.85 (an increase of 6 percent over 1988), and generated royalties of over $100 million. The State of Wyoming receives half the Federal royalties collected on the coal.

Another somewhat different report on Federal coal production released during the third quarter of 1990 summarized Federal coal activities during the 1989 Fiscal Year (October 1, 1988, to September 30, 1989). According to this report, 151.7 million tons of Federal coal were produced in Wyoming. This accounted for about 72 percent of the 211.4 million tons produced nationally (U.S. Department of the Interior, 1990). Montana, Utah, and Colorado accounted for 14 percent, 10 percent, and 7 percent, respectively, of the Federal coal produced. The Federal coal

produced in Wyoming during Fiscal Year 1989 had a total value of nearly $1.3 billion and an average value of about $8.50 per ton.

We note that the average value of a ton of coal on a calendar year basis (as reported by the Minerals Management Service) was $10.85 as compared to the $8.50 per ton reported on a fiscal year basis. The differences in production and prices between various Federal publications are not only complicated by the differing reporting period, but also by the fact that they may include some collections from previous reporting periods, i.e. funds held by litigation, and perhaps reflect corrections as well. Consequently, the statistics in these reports are often contradictory and confusing.

In other developments concerning Federal coal, leasing activities in Wyoming, as well as in other states, appears to be increasing. When the four Regional Coal Teams (RCT's) in the western U.S. were decertified in 1988 and 1989, leasing of Federal coal went to a lease-by-application system. Since the new system was implemented, the Powder River Federal Coal Production Region alone has had 4 coal companies apply for a total of 7,557 acres of Federal coal in 5 tracts adjacent to active mines on existing Federal leases in Wyoming.

Developments in western and southwestern Wyoming

In September, the U.S. Bureau of Land Management held a lease sale for an 81-acre tract of Federal coal located adjacent to Lion Coal Company's Swanson underground mine east of Rock Springs. The tract was sold in response to a lease-by-application submitted by Lion Coal Company. The apparent high bidder at the lease sale was Lion Coal Company, which submitted a bid of $353.37 per acre and a total bid of $28,976.34. Published data for the tract listed recoverable coal reserves of 289,762 tons. The tract contains coal having a heating value of 11,300 Btu per pound, 1.2 percent sulfur, 6.1 percent ash, and 11.7 percent moisture, all on an as-received basis.

The proposed Thousand Springs coal-fired project in northeastern Nevada has apparently been cancelled by its developer, Sierra Pacific Resources. Four of the project's 8 participants withdrew from the project, citing market uncertainties (lowered demand for electric power plus lack of firm purchase contracts), increased cash demands for licensing, and environmental problems. The project was slated to use coal from both western Wyoming (Pittsburg and Midway Coal Mining Company's Kemmerer mine) and Utah. Much of the opposition to the project came from groups in Idaho and Utah concerned with the potential air quality impacts downwind from the plant. The Environmental Impact Statement for the project was due to be completed in January, 1991. Each of the eight 250-megawatt units in the project would have used about 0.9 million tons of coal annually.

Developments in the Hanna Coal Field

Coal from the Hanna Coal Field was tested during the third quarter of 1990 by several utility companies. Iowa Electric Light and Power (IEL&P) tested coal from Rosebud Coal Sales Company's Rosebud mine north of Hanna. Evidently, the test burns were so successful at IEL&P's Sutherland, Iowa, power plant that the utility expects to use 140,000 tons of the 10,600 Btu-per-pound coal by the end of the year.

Niagara Mohawk Power Corporation has also tested coal from the Hanna Coal

Field at two of the utility's power plants in New York. Although no specific tonnages or coal sources were made public, the utility company is evidently planning to blend western coal with eastern coal in the event that clean air legislation mandates a reduction in plant emissions. The utility might blend from 10 to 50 percent western coal. Powder River Basin coals have also been tested by Niagara Mohawk.

Cyprus-Shoshone Coal Company has recently installed a large longwall shearing machine in the Shoshone No. 1 underground mine. The machine, which is capable of cutting a 16.5-foot-high coal bed, will only cut 14.5 feet of the coal bed in the Shoshone mine because the roof support shields are limited to that height. The shearer is 49 feet long with an 8-foot diameter cutting drum and a 1,400 horsepower electric motor. It was reported that Cyprus-Shoshone expects the shearer to help increase production at this mine from 1.5 to 2.0 million tons per year (Taliaferro, 1990).

Developments in the Powder River Coal Field

In late September, Amax Coal Company announced that 50 employees at the Eagle Butte mine and 10 employees at the Belle Ayr mine would be laid off. In explaining the reasons for the cuts, the company cited more efficient mining plans and operational changes, brought about by excess production capacity and depressed spot market pricing. These layoffs are the first since 1987. According to the State Inspector of Mines, the Belle Ayr and Eagle Butte mines averaged 273 and 253 employees, respectively, in 1989.

Amax Coal Company also announced in the third quarter of 1990 that they were considering building up to five more coal drying units adjacent to their Campbell County coal mines. The dried coal product produced from the company's first coal dryer at the Belle Ayr mine has been sold to some electric utility companies (see Coal Contracts - Powder River Coal Field below for details). The dried coal, which has a heating value of from 10,500 to 10,800 Btu per pound and a moisture content of about 10 percent, can be blended with coals having a higher sulfur content to reduce sulfur emissions. The dried coal can also be blended with run-of-mine coal in various amounts to bring up the overall heating value of the coal. A single coal drying plant costs about $14 million to construct and is capable of producing about 1.2 million tons of dried coal each year. If all five additional coal drying plants are constructed, Amax would construct three at the Eagle Butte mine and two more at the Belle Ayr mine.

Each year more companies in the Powder River Coal Field are introducing large draglines for removing the overburden that lies on top of their coal beds. In past years, surface coal mines in the Powder River Coal Field have been dominated by truck and shovel operations. With increased production at many of the eastern Powder River Basin coal mines, the shallowest coal on many mine properties has already been extracted and more overburden must be removed and handled to continue production. The large draglines make it easier and more efficient to handle the large volumes and increased thicknesses of overburden.

In September, Nerco Coal Corporation dedicated a large dragline equipped with a 78-cubic yard bucket on a 295-foot-long boom at the Antelope mine in northern Converse County. This year at the Antelope mine, Nerco is expecting to nearly double their 1989 production of 3.5 million

tons. Cordero Mining Company has also announced that they will be purchasing a dragline before 1992 for their Cordero mine south of Gillette. The North Antelope mine in southern Campbell County has used a dragline since the mine was opened in 1983 and Thunder Basin Coal Company has been operating a dragline at its Black Thunder mine for several years. A dragline has also been used at Thunder Basin Coal Company's Coal Creek mine. Glenrock Coal Company's Dave Johnston mine in converse County has also used draglines extensively in their stripping operation since the mine opened in 1958.

The new Dry Fork coal mine northeast of Gillette began mining operations in August as it became Campbell County's fifteenth active coal mine. The mine is operated by Dry Fork Coal Company, a limited partnership between Phillips Coal Company and Western Fuels-Wyoming, a subsidiary of Western Fuels Association. Initial production of 2.7 million tons per year will be shipped to the Laramie River Power Station north of Wheatland, Wyoming. The mine has an estimated 270 million tons of recoverable coal reserves and is permitted to produce up to 15 million tons of coal per year.

Coal Contracts - Powder River Coal Field

Purchasing activities in this coal field continued during the third quarter with much of the coal being sold on the spot market for test burns, for blending with other coals, and for supplementing existing longer-term contracts.

New coal contracts/sales are summarized below:

1) Nerco Coal Company's Antelope mine will supply 49,590 tons (45,000 metric tons) of coal to the Puentes power plant, which is operated by Endesa, Spain's national utility company. This is the third coal sale that Nerco has made to Spain and follows previous sales made in May and July. The coal was shipped on the Union Pacific Railroad (UP) to the Mississippi River, barged to New Orleans, and then loaded on a ship to Spain. Evidently the coal from previous shipments performed well and blended easily with local Spanish lignites. The sale was arranged through Carbotex, an international coal trading company.

2) Amax Coal Company sold 40,000 tons of spot coal from the Belle Ayr mine to Northern Indiana Public Service Company's (NIPSCO) Mitchell power plant in Indiana. The coal was used during September and October under NIPSCO's "as-needed, as-available" spot coal purchase program.

3) Mobil Coal Producing, Inc.'s Caballo Rojo mine also supplied NIPSCO's Mitchell Plant with 10,000 tons of spot coal for October.

4) Venture Fuels, a coal brokerage company, has arranged deliveries of 350,000 tons of coal per year for five years to Consumers Power Company's B.C. Cobb generating plant at Muskegon, Michigan. Venture Fuels is a partnership between Nerco Coal Company and Midwest Energy Resources Company. The coal will be mined at the Antelope mine in Converse County and at the Spring Creek mine in Montana; tonnages from each mine were not announced. Burlington Northern Railroad (BN) will transport the coal to Superior, Wisconsin, where it will be loaded on barges and transported on lake Superior and Lake

Michigan to the Cobb receiving dock at Muskegon.

5) Cordero Mining Company's Cordero mine will supply up to 400,000 tons of spot coal to Iowa-Illinois Gas and Electric's Louisa power plant in Iowa through the end of 1990. Cordero also supplies long-term contract coal to the same plant. The spot coal will be delivered under previously-existing rail contracts.

6) Sun Coal Company's subsidiary, Cordero Mining Company, will also supply coal from its Cordero mine to Iowa Public Service Company's Neal No. 4 unit south of Sioux City, Iowa. The 750,000 tons of coal will be delivered during the fourth quarter of this year via Western Railroad Properties, Inc., Union Pacific, and Chicago and North Western Transportation Company.

7) Amax Coal Company has signed a new contract with Portland General Electric (PGE) to supply the recently-activated Boardman power plant in Oregon. The new contract was part of a June, 1990, settlement over a lawsuit and a counter-suit filed by Amax and PGE in 1988. At issue was a 1974 take-or-pay contract for 1.2 million tons per year: PGE idled the plant in 1984 and continued to pay Amax for the full amount of the contracted coal (of which only a small amount of coal was ever shipped), but at a coal price that neither party could agree on. Amax Coal Company received $29 million in the settlement and PGE bought out the remainder of the 24-year contract. The new contract has no guaranteed tonnage because PGE has the option of supplementing or substituting other coal for the Amax coal if PGE can obtain it at delivered prices less than Amax's. As a result of the new contract terms, PGE was soliciting for up to 1.3 million tons of spot coal for the Boardman plant for the last quarter of 1990 and the first half of 1991.

Coal purchased for test burns is summarized below:

1) Cordero Mining Company (a subsidiary of Sun Coal Company) began, in mid-September, to furnish up to 200,000 tons of spot coal from the Cordero mine for test burns at Northern States Power Company's Sherco Units 1 and 2 in Minnesota. The coal will be blended with Montana and other Wyoming coals.

2) Amax Coal Company's Belle Ayr mine will supply an undisclosed amount of blended coal (15 percent dried coal product and 85 percent run-of-mine) to Omaha Public Power District's North Omaha power plant in Nebraska. The coal will be tested for a two-month period after being delivered via the Burlington Northern railroad. The blended coal was reported to have a moisture content of 26 percent and a heating value of 8,900 Btu per pound.

3) Amax Coal Company's Belle Ayr mine will also supply from 150,000 to 200,000 tons of run-of-mine coal and 500,000 tons of blended coal to Houston Lighting and Power Company's (HL&P) Parish power plant in Texas. Utility Fuels, Inc., the fuel purchaser for HL&P, arranged the sale. Deliveries began in September and will continue for several months. The blended coal is 15 percent dried coal product and 85 percent run-of-mine coal; the moisture content and heating value of the blended coal is the same as that reported for the coal supplied to Omaha Public Power District (see above).

4) Through December, 1990, Thunder Basin Coal Company's Black Thunder mine will supply up to 20,000 tons of coal a month

to two of Consumers Power Company's power plants in Michigan. Part of the coal is being tested at the Karn No. 2 plant as part of a 5 percent western, 95 percent eastern coal test burn. Part of the coal will also be burned at the Weadock plant, which burns 35 percent western coal.

5) Mobil Coal Producing, Inc.'s Caballo Rojo mine supplied 33,000 tons of test coal to Iowa Electric Light and Power's (IEL&P) Sutherland plant in Iowa and 66,000 tons of coal to IEL&P's Prairie Creek station, which is also in Iowa. The coal going to Prairie Creek will be blended with varying amounts of Illinois Basin coal as well as burned alone.

6) During the third quarter of 1990, Thunder Basin Coal Company's Black thunder mine supplied an undisclosed amount of coal to Wisconsin Public Service Corporation's Pulliam and Weston power plants in Wisconsin. The coal was blended with 20 percent and 25 percent eastern coals, respectively.

7) The Caballo Rojo mine (Mobil Coal Producing, Inc.) sold an additional 100,000 tons of spot coal to Tennessee Valley Authority (TVA) for continued test burns at the Paradise power plant in Kentucky. The sale was arranged through Mobil's coal broker in the eastern U.S., Coal Network, Inc. The coal will be used in experiments to reduce the emissions at the plant, which lacks scrubbing equipment.

8) Triton coal Company's Buckskin mine furnished 10,000 tons of test coal to Iowa Southern Utilities Company's Burlington, Iowa plant. The coal was blended with Illinois coal in amounts up to 50 percent and the test burns were reportedly successful.

9) Niagara Mohawk Power Corporation has burned an unspecified amount of coal from mines in the Powder River Coal Field for testing at its power plants. The coal is being tested as a possible blend with eastern coal to reduce sulfur emissions. The coal was burned at the Dunkirk and Huntley power plants, both in New York.

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## INDUSTRIAL MINERALS AND URANIUM UPDATE

### Aggregate (Construction)

There is significant interest in locating crushed aggregate deposits in southeastern Wyoming. This interest is due to the

construction of the new Denver airport, which will require large amounts of aggregate. This use for Wyoming aggregate, however, is influenced by a number of geologic, economic, and political factors. Suitable construction aggregate deposits near Denver are becoming scarce due to their proximity to residences, and transportation costs from Wyoming sources to the airport site are not much different than from the nearest Colorado sources. Colorado has more costly permitting regulations than Wyoming. However, Colorado may require that a certain amount, up to 100%, of the material used in the construction of the airport come from Colorado. So the development of a materials source in Wyoming is not certain at present.

Railroad ballast is a specific type of construction aggregate. Meridian Minerals produces railroad ballast from a quarry and processing plant at Granite Cañon west of Cheyenne. This property is for sale along with the rest of Meridian's industrial minerals properties in the United States. Other locations in Wyoming, particularly near Wheatland and in the Hartville uplift in east-central Wyoming, continue to be examined for additional ballast sources.

## Bentonite

The primary use of bentonite is for drilling mud, and the major user of drilling mud is the oil and gas industry. Despite the crisis in the Middle East, the amount of oil and gas well drilling in North America is not expected to increase dramatically this year. Consequently, the production of bentonite in Wyoming is not expected to increase significantly. If the crisis is prolonged and oil prices stabilize at high enough levels to promote accelerated drilling activity, the bentonite industry would see a proportionate increase in production.

Bentonite production in Wyoming has been stable since about 1985, after production fell from record levels in the early 1980's. Although none of the bentonite producers has announced any plans for expansion, Baroid, which was trying to sell its mothballed property east of Lovell, is no longer interested in selling the plant and may resume production there in the future. Baroid is also restructuring its operations according to a recent article in the Wall Street Journal. It will separate its petroleum-related service operations from its mining operations, including the bentonite mining operations in Wyoming. The company will then be known as Baroid Corporation.

## Diatomite

Diatomite is a siliceous rock composed of the skeletal remains of one-celled organisms called diatoms. Diatomite is used in filters. Most domestic diatomite is produced in California, Nevada, and other west coast states. This summer there have been some inquiries about occurrences of diatomite in Wyoming. Known occurrences are summarized by Harris and King (1986). A diatomite source in Wyoming would benefit by lower transportation costs to the industrial midwest and east coast area, which use much of the diatomite produced in the United States.

## Gypsum

In Wyoming, gypsum is produced at two plants in the Bighorn Basin (near Cody and at Himes, between Lovell and Greybull). Production at these plants is continuing at levels near capacity. Mountain Cement also mines gypsum near Laramie for use in producing cement.

Nationally, 1990 gypsum production is about 20% higher than in 1989 according to reports released by the U. S. Bureau of Mines. Gypsum producers in Wyoming, however, have not announced any plans for expansion and there has been no indication of new companies coming in.

Limestone

Divide Construction quarried limestone from the Bass Quarry north of Hartville for use in controlling emissions at the Laramie River power plant. Limestone was also quarried in several areas of the State either for construction aggregate or for the manufacture of cement. Pete Lien and Sons, Inc. filed for a permit to open a limestone quarry two miles east of Laramie, Wyoming. According to Laramie and county officials, the limestone from the quarry will be trucked to Fort Collins for processing. The limestone in Lien's proposed quarry is a high-calcium zone in the Permian-Pennsylvanian Casper Formation. It is suitable for industrial uses including the manufacture of lime (CaO).

There has been an increase in exploration for limestone deposits in Wyoming. Missouri Basin Power, which operates the coal-fired Laramie River power plant near Wheatland, and several other power plants in other states, particularly North Dakota, are looking for limestone as a source of lime for control of plant emissions. Some North Dakota companies also want limestone to test some methods of increasing the combustion rates of low-Btu coals and North Dakota lignites. Several limestone occurrences in eastern Wyoming were tested this summer, including a deposit near Manville (Harris, 1987) and a deposit just east of Guernsey, Wyoming.

Because limestone is also cut and polished for decorative stone, some limestone locations in Wyoming have also been sampled to evaluate them for this use.

Silica

A California company that had been studying the feasibility of constructing a glass plant in Wyoming dropped its plans and lease on the Cassa silica property (Harris, 1988b) in September. The company had been in financial problems due to the drought in California and could not invest in a glass plant at this time. However, other companies are taking a look at this and other silica sources in Wyoming. Deposits near Laramie (Harris, 1988a) and Lovell are also attracting interest. The Geological Survey of Wyoming is preparing a technical report on the Lovell deposit.

Wyoming silica may be suitable for the production of several kinds of glass, for high purity silica ($SiO_2$) and glass pellets, for foundry sand, and for hydraulic-fracturing sand. Because soda ash (refined trona) is a major ingredient in the manufacture of glass and because 90 percent of the soda ash produced in the U. S. comes from the trona patch near Green River, Wyoming, the cost of transporting raw materials to glass plants can be saved if glass is manufactured near the raw materials in Wyoming.

Stone (decorative and dimension)

As part of an ongoing project, the Industrial Minerals and Uranium Division of the Geological Survey of Wyoming has now prepared over eighty cut and polished samples of decorative rock from Wyoming, some suitable for dimension stone. These samples

are available for inspection in the Geological Survey building in Laramie. Interested persons should call Ray E. Harris at (307) 766-2286. These decorative rocks are suitable for use as facing materials, in floors, in walls, as tile, and as shaped and polished decorative stone.

Sunrise Stone is proceeding with its plans to produce decorative stone quarried in Wyoming.

Trona and its products

The demand for products produced from trona continues to increase at a rapid rate and most of the producing Wyoming companies have announced expansion plans, including the construction of new product plants. Trona is primarily used to make soda ash, caustic soda, sodium cyanide, and other sodium compounds. All of these products are produced in Wyoming by five companies located west of Green River. These five companies produce 90 percent of the sodium compounds manufactured in the U. S., and they have enough underground reserves of trona to last hundreds of years. Exports account for around 20% of Wyoming's production. Since exports are not increasing as rapidly as domestic purchases of sodium products, this proportion is decreasing. The following is a company-by-company report on activities for the third quarter of 1990:

FMC Wyoming

FMC, a part of FMC Corporation, operates the world's largest trona-complex. This underground mining operation is also Wyoming's oldest trona producer. FMC has recently modernized its underground mining operation through the installation of a longwall mining machine. Past mining methods were primarily room-and-pillar operations involving a variety of mining machines. The length of the underground workings in this mine exceeds 2,500 miles. FMC is also producing trona by an in-situ, solution-mining process, and it is recovering trona from brines in its evaporation ponds.

FMC's on-site plants produce 2.85 million tons of soda ash by two methods (the sesqui- and the mono-methods). They also produce sodium phosphate, sodium tripolyphosphate and tetrasodium pyrophosphate, sodium bicarbonate, and sodium cyanide. FMC recently expanded and modernized its soda ash facilities; its sodium cyanide and sodium phosphate plants were dedicated this year.

General Chemical Company

General currently produces 2.2 million tons of soda ash and plans to expand this production by 0.3 million tons per year. In the third quarter of 1990, members of the United Steelworkers of America rejected an offer by the company for a new three-year contract and threatened a strike. However, by the middle of September, tentative agreements between the union and company management had been made, and the possibility of a strike seemed to have been averted.

Rhone-Poulenc of Wyoming Company

Rhone-Poulenc is a joint venture between Rhone-Poulenc Basic Chemicals Co., and Union Pacific Resources Co. Construction has begun on the company's announced plant expansion. This expansion will result in about a 17% increase in output of soda ash (about 0.33 million tons per year), and will not require any expansion of their underground mine as the existing mine is sufficient to supply the expanded plant.

Currently the plant produces 1.96 million tons of soda ash each year.

Tenneco Minerals Company

Tenneco, which recently joined with Asahi Glass Company, Japan's largest glass producer, announced a two-stage plant expansion. A first stage expansion, approved by the Wyoming Industrial Siting Administration (ISA), will increase soda ash production capacity to 2 million tons per year, a 0.75 million ton per year increase. A second stage expansion, not yet approved by the ISA, will increase production by another 2 million tons of soda ash per year, making this operation the second largest, after FMC. Tenneco has also announced plans to construct a 75,000-ton caustic soda plant.

Tg Soda Ash, Inc.

Due to the demand for caustic soda (NaOH). Tg has announced tentative plans to build a new $40 million caustic soda plant at its soda ash complex northwest of Green River. Tg will recover the feedstock for this new plant from waste water removed from the mine.

This expansion project, which is slated for completion by 1992, is a joint venture between Tg and Atochem North American, Inc., both of which are subsidiaries of Elf Aquitaine, Inc. of Paris, France. Tg currently produces about 1.3 million tons of soda ash per year, and is expected to produce about 0.1 million tons of caustic soda per year from its projected plant.

All of this activity has fueled a near-boom demand for construction workers necessary to build the new plants. Permanent employment is also expected to increase as new plants are brought on line. At the present time, the trona patch is certainly the brightest spot in Wyoming's nonfuel mining industry.

Uranium

Quoted uranium prices increased again this quarter, from just over $11.00 per pound of $U_3O_8$ to almost $12.00 per pound. Purchasers of uranium are finding that stockpiles of mined uranium from the early 1980s are depleted. As a result, the price of uranium is increasing and, according to one industry official, may reach $20.00 to $24.00 in a year or two.

While depleted stockpiles and price increases bode some optimism for the future of Wyoming's uranium industry, the only uranium production in Wyoming in the third quarter of 1990 was at Power Resources (London Central Energy) in-situ (solution-mining) operation at the Highland mine property in Converse County. Power Resources is also constructing an in-situ well field on the North Morton Ranch ore body, formerly owned by Tennessee Valley Authority.

The in-situ or solution-mining process for uranium involves the injection of solutions into the ore body. These solutions, which are introduced through bore holes, dissolve the uranium minerals. The resultant uranium-rich solutions are pumped to the surface where processing precipitates the uranium as uranium oxide (yellowcake). After treatment, the solutions are reusable.

Electricitie de France (EdF) purchased Malapai Resources' Irigary and Christiansen Ranch in-situ properties in late September. Malapai's holding company, Pinnacle West Capital Corp., had shut down the Irigary facility in January. Total Minerals Corp., a

wholly-owned subsidiary of EdF, will be the new operator for both of these Johnson County facilities. Total Minerals plans to have the two facilities operational in 1992.

Rio Algom is drilling an in-situ well field northwest of the Bill Smith shaft, which was recently purchased from Kerr-McGee. Rio Algom is a wholly-owned subsidiary of RTZ, a British mining company.

Uranerz, USA, Inc., a German company, recently announced that it had applied to the State for an in-situ mining permit. Uranerz's well field and recovery plant would be located south of the Pumpkin Buttes in Campbell County.

COGEMA's Pathfinder Mines is continuing to strip overburden at the Shirley Basin open pit mine in Carbon County. Production of yellowcake from the Shirley Basin mill is expected to resume late this year.

President Bush signed the bill that provides compensation to uranium miners who became ill due to the effects of radon gas in underground uranium mines. Radon gas is a product of the natural atomic decay of uranium and thorium. It is now known to concentrate in unventilated areas and, since it is a heavy gas, it concentrates further in low areas. Radon is suspected to be a cause of certain kinds of cancer. Originally, uranium miners in Wyoming had been excluded from the bill. The bill also compensates persons exposed to radiation from surface atomic weapons tests conducted between 1951 and 1958 and in 1962.

## Vermiculite

Vermiculite is a mineral of the clay family that expands when heated. This produces a lightweight product called expanded vermiculite or "vermiculite". Expanded vermiculite is used in insulation, as a soil conditioner, in concrete, and in other uses such as potted plant soil.

With the announced closure of the largest producing vermiculite mine in the U.S., the Rainy Creek mine near Libby, Montana, interest in vermiculite deposits has increased. There are several known vermiculite occurrences in Wyoming, some of which produced vermiculite in the 1950's (Harris, 1990). The Industrial Minerals and Uranium Division has received numerous inquiries regarding these vermiculite deposits, and several deposits have been examined in the field. While rumors had indicated that one company had already begun mining, no mining permits have been filed with the Wyoming Department of Environmental Quality.

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Ray E. Harris
Industrial Minerals and Uranium Division Head
Geological Survey of Wyoming

## METALS AND PRECIOUS STONES UPDATE

During the last two quarters, several companies conducted reconnaissance studies of various mineral deposits in Wyoming (Principally for gold and copper). A few companies announced intentions to continue to explore and invest exploration dollars in the Cowboy State.

During the summer and fall field season, the Head of the Metals and Precious Stones Division of the Survey led five field trips to mining districts in Wyoming, but additional company requests were too numerous to handle.

### Diamond

Exploration for diamond deposits resumed this summer with staff of the Geological Survey of Wyoming searching the central Laramie Range for indications of diamondiferous kimberlite and lamproite. The project was also expanded into the Medicine Bow Mountains in the vicinity of Mullison Park where two diamonds were discovered in 1977. Samples collected during the summer are currently being processed and examined.

### Seminoe Mountains

The Geological Survey's Metals and Precious Stones Division continued field studies in the Seminoe Mountains greenstone belt throughout the summer. Many samples were collected for laboratory work and detailed mapping of lithologies and structures continued. Samples collected during this field season are currently being analyzed for metals and for whole rock chemistry.

The Seminoe Mountains is a relatively young greenstone belt (2.7 to 2.9 billion years old), with a lower mafic to ultramafic metavolcanic unit having an apparent thickness of nearly 10,000 feet. The lower unit is overlain by an ultramafic unity with nearly 1,000 feet of serpentinites and spinifex-textured basaltic and periodotitic komatiites. This unit is overlain by several hundred feet of banded iron formation, clastic metasediments, felsic metavolcanics, and metagabbro. Gold in the greenstone belt occurs in veins associated with pervasive chloritic alteration, sulfides, quartz, and calcite.

### South Pass

Goldstake Explorations Inc., of Toronto, announced in the Mining Record (v. 101, no. 31, Aug. 1, 1990), p.1) that they are selling 40% of their gold reserves in their mine in South Dakota. "Part of the proceeds of the sale will be used to develop Goldstake's major projects, particularly the Stowell (in the Black Hills) and the South Pass (in Wyoming)". The Northern Miner (July 2, 1990, p. 13), went on to say that Goldstake was "...undertaking a 100-hole drilling program this summer".

A paper on some gold deposits in the South Pass region was recently published by the Society for Mining, Metallurgy, and Exploration (Hausel, 1990).

Powder River Basin

The Geological Survey of Wyoming has published a map which shows occurrences of metallic and radioactive minerals and lapidary materials in the Powder River Basin and the Black Hills of Wyoming (Hausel and others, 1990). The occurrences include gold anomalies in the norther portion of the basin north of Gillette, gold and silver anomalies in the Cambria coal mines north of Lusk, gold and tin anomalies in oil wells west of Newcastle, gold deposits north of Sundance, titanium-iron-rare earth deposits southwest of Midwest, and chromium and manganese deposits south of Casper.

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Deputy Director
Geological Survey of Wyoming

# Wyoming Agricultural Outlook

Recent commodity market developments point to lower season average prices for most agricultural products as we look toward 1991. Lower prices for corn, wheat, milk and most other non-livestock products are expected to decline in value due to relatively large supplies and declining exports. There will be some offsetting effects on other sectors of the agricultural economy, notably livestock, that will keep total farm income at strong levels, however. Mounting farm expenses will dampen higher livestock prices and any unexpected price increases in the grain sector. The surge in oil prices since August has increased farm expenses for all producers. The total impact will be felt in the 1991 production year as higher oil and energy prices work its way through the system. All production and marketing factors from fertilizer to transportation will cost more in the coming production year.

In the U.S., slowing domestic demand growth, the hike in oil prices, and the downward revisions in GNP growth have worsened prospects for economic growth and inflation. U.S. agricultural exports, both value and volume, are expected to slip during fiscal 1991. Wheat, rice and corn exports are expected down because of large foreign supplies in importing and exporting countries.

It should be noted, however, that since the last oil shock and recession in the early 1980's, U.S. farmers and ranchers have undergone a major financial restructuring. Total farm debt has dropped about a third from the 1983 peak of $193 billion. Farmers' debt repayments are forecast to equal 11 percent of gross cash income (receipts plus government payments) in 1990, compared with a peak of nearly 20 percent in 1983. With a lighter debt burden and high incomes in 1990, U.S. farmers are in a stronger position to withstand a drop in income.

## GRAIN SITUATION

The world's farmers are harvesting a record grain crop in 1990/91, with output up nearly 5 percent from last year. The higher prices of recent years, good weather around the world, and low U.S. acreage reduction requirements are all contributing to the increase. With the large harvest in most of the importing countries, world trade in grains is expected to drop nearly 5 percent. Global grain output is forecast to exceed consumption in 1990/91, and carryover stocks will rise for the first time in 4 years. Wheat will account for most of the stocks gain, while coarse grain stocks are expected to decline marginally.

The world wheat crop in 1990/91 is showing the largest 1 year jump in over a decade. Crops of the major exporters - Argentina, Australia, Canada, the E.C., and the U.S. are forecast up 17 percent, led by very large gains in the U.S. and Canada. The E.C. also had its best crop since 1984. At the same time, large harvests by traditional importers also are restraining demand. China's crop is probably record high, and the USSR is expected to produce its largest crop in over a decade.

The large U.S. and foreign wheat crops have sharply depressed prices. In the U.S., USDA forecast prices to be 23 to 31 percent below last year. Prices in some foreign markets are down even more than

domestic prices because exporter subsidies have increased. Average EC export restitutions have nearly doubled since January, and U.S. bonuses for wheat sales under the Export Enhancement Program have recently exceeded $50 per ton. U.S. exports in 1990/91 are forecast to be down 9 percent from last year. The low wheat prices and the slow pace of export sales encouraged the Secretary of Agriculture to announce a tentative 15 percent Acreage Reduction Program (ARP) for the 1991/92 wheat crop.

The Soviet Union and the Eastern European block creates the largest question mark for world trade in the coming year. The soviets are the most important source of year-to-year variability in world grain trade. This past year's political and economic turmoil heightens the uncertainty about Soviet grain purchases. The Soviet Union was expected to harvest its largest crop since the 1978/79 record. Combined wheat and coarse grain production is forecast to be up 25 million tons, 13 percent larger than last year's large crop. Because of the larger crop, import needs for coarse grains this year are likely to be 40 percent less than last year. Current rumors in the trade industry indicate the Soviets are poised to enter the market after January 1991, which would push grain prices higher.

## LIVESTOCK SITUATION

The U.S. livestock industry is a major winner as a result of lower grain prices. The large supplies of feed grains and wheat have reduced feeding costs for all sectors of the livestock and poultry industry. Winter feed supplies across the West generally appear adequate. There will be some spot shortages in portions of the northern Plains and the far West, but larger forage supplies in adjoining areas should soften the localized drought effects.

In the months ahead, fed cattle marketings will increase, but much of that rise will be offset by lower cow slaughter. Fueled by late October and early November's sharply lower slaughter levels, choice steer prices set new record highs in the southern Plains. By early November, choice steers were bringing over $81, nearly $3 per cwt. above September's average and more than 8 percent above year earlier prices.

Larger feedlot inventories will continue to support larger fed cattle marketings into early 1991. January-March feedlot marketings should average about 3 percent higher than year earlier numbers. Part of this increase will be offset by lower cow slaughter. Still, the first quarter's total slaughter and beef production may average 2 to 3 percent above that for 1990.

Reflecting smaller supplies and lower feed costs, feeder steer and calf prices will remain relatively strong throughout the winter months. This year's smaller calf crop and recent months' larger feedlot placements tightened the feeder cattle supplies outside of feedlots. Along with this smaller supply, informal reports suggest larger numbers of calves and feeder cattle have been forward contracted. That could further tighten available supplies.

In October, average returns for feeding 700 to 800-pound steers dropped near break-even levels. These tighter margins mostly reflected feeders' summer price rise into the low $90s per cwt. Prices for 7-800-pound feeder steers could average in the upper end of the $80s during 1991's first quarter, but drop to a lower $80s average during April-June. Seasonally stronger demand for grass cattle next spring may push calf prices back into the $105 to $110 area during 1991's first quarter.

The nation's hog producers are cautiously expanding production, despite almost a year of favorable returns. Earlier this year, concerns about the late corn crop and an expected sharp drop in hog prices in late summer clouded the longer-term profit picture. Hog prices did drop sharply in August, as expected, but rebounded counter-seasonally in September. Lower corn prices and higher hog prices have improved prospects for future hog production. Favorable producer returns are expected for the remainder of this year and most of next.

Growth in the nation's sheep flock may have slowed this year. If so, slaughter lamb prices probably will be near to slightly above 1990 levels throughout the first half of 1991. Average dressed weights for lambs slaughtered under federal inspection this year have been above both the 1989 and the five-year averages. These heavier carcasses, coupled with high slaughter volume, have put more lamb on the market that could be cleared at profitable price levels. The result has been slaughter lamb prices below 1989 levels all year.

Positive factors for the industry include lower feed grain prices, good demand at the retail level and per capita consumption of 1.4 pounds, up 7 percent from 1987's level.

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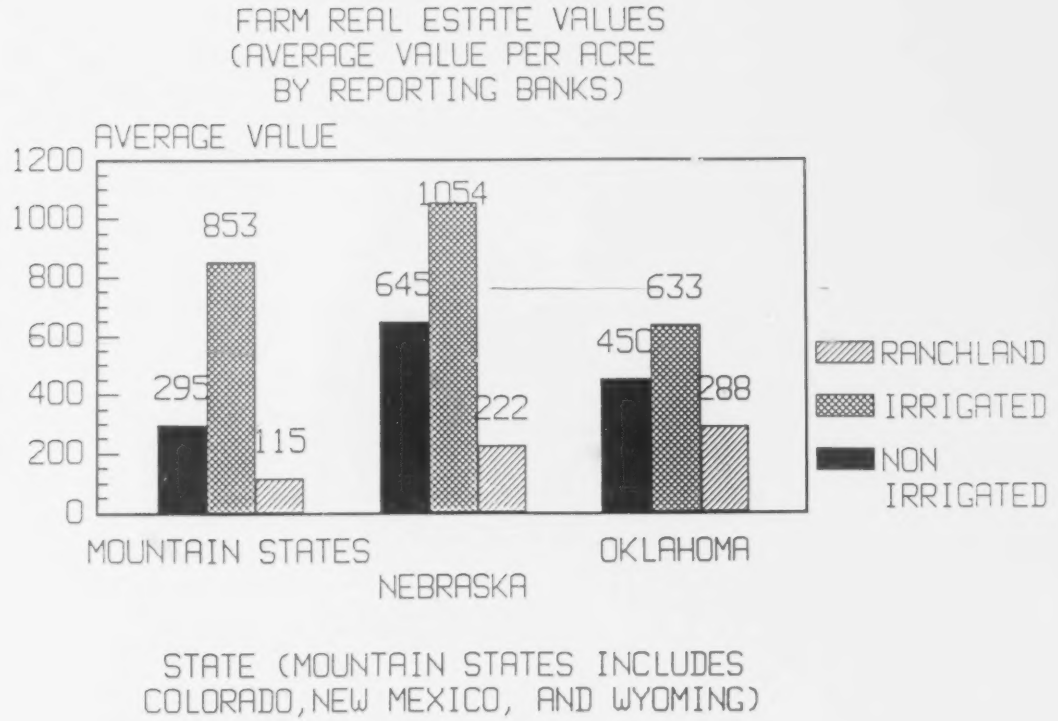
University of Wyoming

# FYI




Source: Federal Reserve Bank of Kansas City

# Job Openings Outlook

## ACCOUNTING AND STATISTICAL CLERKS

Accounting and statistical clerks prepare numerical records for reports, research, financial statements, and payroll use. Statistical clerks collect and record data to be analyzed for decision making in various organizations. Duties may involve summarizing data; compiling sales records; computing figures using formulas; preparing graphs and tables; and sorting, coding, and filing various kinds of information. Accounting clerks maintain records of accounts for businesses by updating their daily transactions. Duties may include recording, compiling, and tabulating financial transactions using adding machines, calculators and computers. Many accounting clerks are responsible for payroll deductions and bills paid and due. Other duties may include typing vouchers and invoices, and filing records of accounts.

Accounting and statistical clerks must have good ability to work with numbers, ability to do detailed work with data and to be precise while working within set standards. Good eye-hand coordination is necessary for operating an office machine while concentrating on various types of data. Some positions may require a worker to adjust to a routine. Most clerks work a 40-hour week in various types of office settings. Work requires periods of concentration under normal supervision with little room for error.

Some employers provide informal on-the-job training. High school courses in typing, bookkeeping, and business math are helpful. Post-secondary training available at community colleges and technical schools offer the necessary background required for most positions.

This is a medium occupation in Wyoming employing about 960 accounting and statistical clerks. The employment outlook for these occupations depends on general statewide economic growth, the number of trained workers moving into the state, and the demand created by workers who leave the occupation or advanced to other positions. Presently, turnover in Wyoming is low due to the economic condition of the state. As automation increases, combining these jobs with others will decrease demand for workers. Nationally, job prospects for accounting clerks are good due to the large number of openings that will occur due to the need to replace workers. Little change is expected in employment through the year 2000. Job prospects for statistical clerks is expected to decline through the year 2000. Technological advances will mean fewer statistical clerks will be needed.

Wages vary with employer, amount of training, and experience. Entry wages are between $750-1,300 per month. Salary increases depend upon employer policy and length of service. Maximum salaries are between $1,180-1,550 per month. Nationally, the median annual salary for accounting clerks is $14,900, this is slightly higher for statistical clerks at $17,800.

## LAW ENFORCEMENT OFFICERS

Law enforcement officers are responsible for enforcing laws and maintaining order. Their principle duties are to protect life and property, prevent crimes, investigate complaints and crimes, apprehend and arrest violators, and assist in their prosecution. Officers also prepare and submit reports of their activities and testify in court. Studies show that about 80 percent of a police officer's time is spend providing a wide variety of community services and peacekeeping functions such as giving directions, handling traffic accidents, and resolving family disputes. On the average, less than 20 percent of an officer's time is spent on crime-related activities.

Law enforcement officers must have the ability to make sound judgments and rational decisions and perform well under stress. They must be able to relate and communicate effectively with people verbally and in writing. They must have the ability to observe and remember detail.

Law enforcement officers work both indoors and outdoors, working irregular hours as well as holiday and weekend duty. The majority of jobs are in three areas: patrol, traffic and detective work. Officers in small police departments probably work in all three; in larger departments, they may specialize in only one. The injury rate is higher than in many other occupations and reflects the risk officers take in pursuing speeding motorists, capturing lawbreakers, and dealing with public disorders.

Employers report a preference for individuals with two years of college education. Applicants must pass several examinations including written, psychological, fitness/agility, and oral interview tests. A background investigation is also conducted. Applicants with court convictions may be disqualified. Candidates must also meet age requirements. Training includes attending a law enforcement academy.

Entry salary for city patrol officers ranges from $1,370-1,600 per month. Maximum salary ranges from $1,730-2,030 per month. Wyoming highway patrol officers entry salary is about $1,495 per month with maximum salary about $2,300 per month. It usually takes around 10 years to reach this pay level. Deputy sheriffs entry salary averages about $1,400 per month. Maximum salary is around $2,000 per month. Correctional officers entry salary is around $1,260 per month. Maximum wages range from $1,800-2,000 per month.

Outlook depends on the expansion of protective service forces, public financial support, and community growth. In most cities, due to budgetary constraints, there has been little hiring for new positions. Those with prior correctional experience will fare best. Nationally, employment is expected to increase through the year 2000. The number of job applicants usually exceeds the number of job openings in many state and federal agencies.

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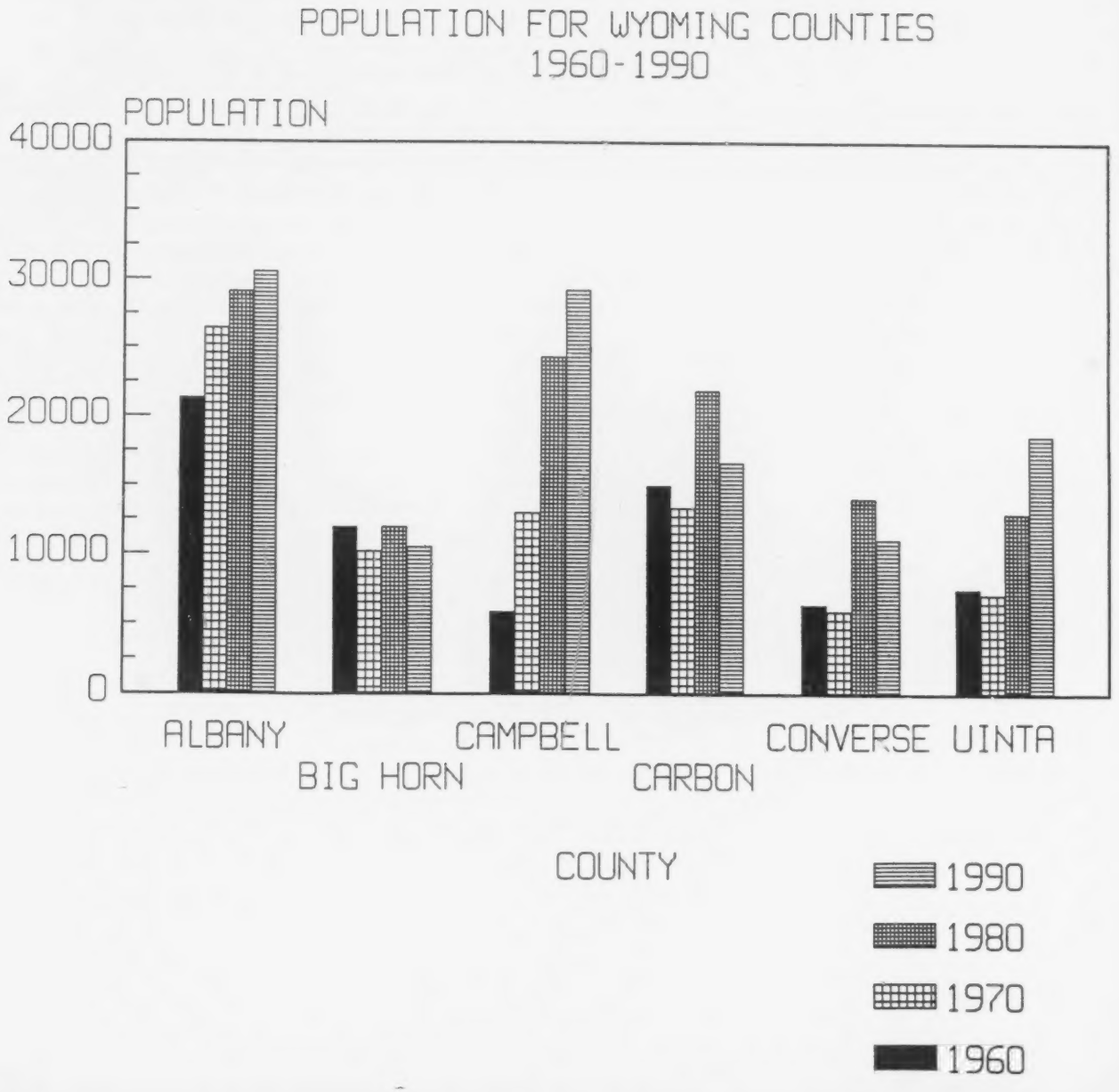
Research Assistant, WCIS

# 1990 Census: Preliminary 1990 Results For Wyoming Counties

Below is a list of 1990 census population counts for Wyoming Counties including the 1980 count for comparative purposes.

| County | 1980 | 1990 Preliminary | Change 1980-90 | % Change |
|---|---|---|---|---|
| Albany County | 29,062 | 30,496 | 1,434 | 4.9% |
| Big Horn County | 11,896 | 10,462 | (1,434) | -12.1% |
| Campbell County | 24,367 | 29,190 | 4,823 | 19.8% |
| Carbon County | 21,896 | 16,629 | (5,267) | -24.1% |
| Converse County | 14,069 | 11,100 | (2,969) | -21.2% |
| Crook County | 5,308 | 5,277 | (31) | -0.6% |
| Fremont County | 38,992 | 33,342 | (5,650) | -14.5% |
| Goshen County | 12,040 | 12,319 | 279 | 2.3% |
| Hot Springs County | 5,710 | 4,794 | (916) | -16.0% |
| Johnson County | 6,700 | 6,129 | (571) | -8.5% |
| Laramie County | 68,649 | 72,319 | 3,670 | 5.3% |
| Lincoln County | 12,177 | 12,514 | 337 | 2.8% |
| Natrona County | 71,856 | 60,962 | (10,894) | -15.2% |
| Niobrara County | 2,924 | 2,488 | (436) | -14.9% |
| Park County | 21,639 | 22,727 | 1,088 | 5.0% |
| Platte County | 11,975 | 8,137 | (3,838 ) | -32.1% |
| Sheridan County | 25,048 | 23,527 | (1,521) | -6.1% |
| Sublette County | 4,548 | 4,836 | 288 | 6.3% |
| Sweetwater County | 41,723 | 38,567 | (3,156) | -7.6% |
| Teton County | 9,355 | 10,631 | 1,276 | 13.6% |
| Uinta County | 13,021 | 18,624 | 5,603 | 43.0% |
| Washakie County | 9,496 | 8,321 | (1,175) | -12.4% |
| Weston County | 7,106 | 6,514 | (592) | -8.3% |
| Wyoming | 469,557 | 449,905 | (19,652) | -4.2% |


POPULATION FOR WYOMING COUNTIES
1960-1990
POPULATION
40000
30000
20000
10000
0
ALBANY
BIG HORN
CAMPBELL
CARBON
CONVERSE
UINTA
COUNTY
1990
1980
1970
1960

# Wyomingites' Views In 1990

In October of this year the Political Science Department commissioned the Survey Research Center at the University of Wyoming to conduct a poll concerning the views of Wyoming's citizens. The random poll included 600 Wyoming adult residents, 287 males and 313 females. A follow-up survey was conducted in the week after the election. A total of 568 of these same individuals were called back to check on the validity of the survey. While the election is over and done, the survey provided information on a wealth of topics other than the political races. Comments ranging from the war in Iraq to viewpoints on gun control, together with a variety of national and local political questions, provided an interesting look at the attitudes of Wyomingites. While a myriad of information is available from the survey only part of the results is presented. However, viewpoints on policies which effect Wyoming and the Nation, the men that make those policies, and opinions on hot issues such as gun control and the death penalty will be discussed.

With a few exceptions, Wyoming residents were happy with the state in general. They trusted the political leaders in Wyoming and were optimistic about our economic future.

The table below indicates the responses given by respondents when asked to rate the job of Wyoming's officials.

Expected differences in the ratings of political leaders were noted when controlling for party registration of the respondent. For example, 72.6% of the Democrats rated Sullivan good or excellent while only 54.1% of the Republicans did so. What is interesting is the fact that only a little over a third of the respondents rated Thomas good or excellent (47.9% for Republicans and 26.8% for Democrats) yet he was still re-elected. Almost half of the respondents (49.3%) indicated they would vote for Thomas and well over half (60.3%) actually voted for Thomas according to the follow-up survey.

Respondents were asked a series of questions to determine how they felt about the state government in general. The responses in Table 2 indicate that respondents feel they can trust our state government to do what is right and to run the state for the benefit of all residents. And, while they don't believe the individuals running the state government are "crooked", they also don't believe they spend the taxpayers' money wisely on occasion.

Table 1

RATINGS FOR WYOMING LEADERS
(In percents)

| | Excellent | Good | Fair | Poor | Don't know | Planned to vote for candidate | Did vote for candidate |
|---|---|---|---|---|---|---|---|
| Mike Sullivan | 8.2 | 48.8 | 31.2 | 6.7 | 5.2 | 61.0 | 70.5 |
| Malcolm Wallop | 5.5 | 34.8 | 30.8 | 18.8 | 10.8 | | |
| Alan Simpson | 13.7 | 40.8 | 25.8 | 12.3 | 7.3 | 64.5 | 67.3 |
| Craig Thomas | 5.2 | 33.8 | 31.3 | 10.2 | 19.5 | 49.3 | 60.3 |

Table 2

PERCEPTIONS ON STATE GOVERNMENT

| Question | Responses (in percents) |
|---|---|
| You trust the state government in Cheyenne to do what is right: | Just about always - 6.5<br>Most of the time - 48.3<br>Some of the time - 39.7<br>None of the time - 2.2<br>Don't know - 3.3 |
| Would you say the government in Cheyenne is run by: | A few big interests - 27.5<br>For the benefit of all - 57.2<br>Undecided - 9.8<br>Don't know - 5.5 |
| Concerning the money we pay in taxes, the people in the state government: | Waste a lot - 19.7<br>Waste some - 56.5<br>Don't waste much - 17.0<br>Don't know - 6.8 |
| Concerning the people themselves running the state government in Cheyenne: | Quite a few are crooked - 7.0<br>Not many are crooked - 41.0<br>Hardly any are crooked - 43.2<br>Don't know - 8.8 |

Table 3

ECONOMIC PERCEPTIONS

| Statement | Responses (in percents) | | | | |
|---|---|---|---|---|---|
| | Strongly agree | Agree | Disagree | Strongly disagree | Don't know |
| State spending for Economic Development has effectively improved Wyoming's economy. | .7 | 32.7 | 43.2 | 6.2 | 17.3 |
| There is very little that Wyoming state government can do about Wyoming's depressed economy. | .5 | 16.0 | 62.5 | 14.5 | 6.5 |

This sentiment is supported by the fact that almost half (49.4%) strongly disagreed or disagreed that state spending for economic development has improved Wyoming's economy, yet over three-quarters felt there were things the State government could do about Wyoming's depressed economy (77% strongly disagreed or disagree with the statement that there was very little that the State government could do about Wyoming's depressed economy.) In other words, respondents felt the state government could do something about the economy but what they are doing now is not working to a great extent.

Only a quarter of the respondents felt their financial situation had improved over the last few years. Responses to questions regarding the respondent's perception of his or her present and future financial situation as well as that of the state are shown in Table 4.

Although the majority feel Wyoming's economy has stayed the same or gotten worse over the last couple of years, well over half (68.2%) are optimistic that the economy will improve within the next five years. This optimism is not shared on a personal level. Almost half (47.2%) speculated that their current financial situation would remain the same in the next year.

Well over three-quarters of the people polled (89.8%) felt that taxes in Wyoming were reasonable and over three-quarters (76.4%) were amenable to paying more taxes if the money was used in agreeable areas. These positive spending areas, as seen in Table 5 include public schools, community colleges, the University of Wyoming, economic development, water development, and health and social services.

Table 4

PERCEIVED AND SPECULATED FINANCIAL SITUATION
(In percents)

| | Gotten better/ Will get better | Stay same | Gotten worse/ Will get worse | Don't know |
|---|---|---|---|---|
| During the last few years has your financial situation: | 24.7 | 40.7 | 33.8 | .8 |
| During the last few years has Wyoming's economy: | 17.8 | 38.7 | 39.8 | 3.7 |
| In the next year, do you think your financial situation: | 27.5 | 47.2 | 21.7 | 3.7 |

| | Next couple of years | Next 5 years | Next 10 years | May never | Don't know |
|---|---|---|---|---|---|
| When will Wyoming's economy improve: | 22.7 | 45.5 | 14.8 | 7.7 | 9.3 |

Table 5

STATE SPENDING
(In percents)

| | Favor spending more | Favor Spending less | Keeping spending levels same | Don't know |
|---|---|---|---|---|
| Local public schools | 58.0 | 3.8 | 34.8 | 3.3 |
| University of Wyoming | 51.3 | 4.5 | 34.8 | 9.3 |
| Community colleges | 51.0 | 3.7 | 39.0 | 6.3 |
| Health & social services | 50.0 | 9.5 | 36.5 | 4.0 |
| State economic development | 48.8 | 8.8 | 33.3 | 9.0 |
| Water development | 48.0 | 4.3 | 39.5 | 8.2 |
| Law enforcement and correction | 42.2 | 5.5 | 47.2 | 5.2 |
| Streets and highways | 31.7 | 5.5 | 60.7 | 2.2 |

While this appears to be a rather magnanimous gesture on these taxpayers part, in realty they are a little less willing to increase taxes which will affect them "where they live" so to speak. In other words, respondents were much more willing to accept "sin taxes" such as cigarettes, beer, hard liquor and wine than they were property taxes, gasoline, and sales tax. (See table 6)

The issue of severance tax is not as cut and dry. An almost equal amount were in favor of or opposed to an increase in severance tax. This attitude was mirrored in an additional question on severance taxes. When asked if reducing Wyoming's severance tax level would promote economic development in the state, 31.8% strongly agreed or agreed while 40.1% strongly disagreed or disagreed.

Before focusing on opinions on national topics, here is a look at the University of Wyoming. Over three quarters (76%) felt that UW should play a role in the development of the state's economy. Towards that end, a majority (80.7%) felt that UW should not reduce the number of degree programs available. Over half of the respondents (58.8%) felt that UW has improved over the last several years and perhaps they feel that reducing degree programs would be a backward step in that development. This positive viewpoint of the University is echoed for other education arenas. Wyoming's public schools and community colleges as well as the University were all given a "B" grade for the quality of their work.

Table 6

AREAS FOR TAX INCREASE
(In percents)

| | Favor tax increase | Oppose tax increase | Don't know |
|---|---|---|---|
| Hard liquor | 85.0 | 13.2 | 1.8 |
| Wine | 83.8 | 14.3 | 1.8 |
| Beer | 81.0 | 17.0 | 2.0 |
| Cigarettes | 78.7 | 18.8 | 2.5 |
| Sales tax | 55.0 | 42.3 | 2.7 |
| Severance | 38.7 | 43.2 | 18.2 |
| Gasoline | 27.7 | 70.3 | 2.0 |
| Property tax | 21.5 | 75.0 | 3.5 |

The national government did not fare as well in the eyes of Wyoming's citizens. Unlike our state government, respondents felt the U.S. government is run by a few big interest groups, quite a few in the federal government are crooked, and you can only trust them some of the time (see table 7). President Bush was rated excellent or good by only 48.8% of the people. A fairly wide margin appeared when controlling for party affiliation. Two-thirds of the Republicans rated Bush excellent or good (66.5%) while only about one-quarter of the Democrats did so (29.4%).

A rather negative view of the nation's economy was apparent in most of the respondents. Only about one-quarter of the respondents felt the nation's economy had gotten better or stayed the same in the last year (27.4%). Most (69.2%) indicated it had gotten worse. Related to this, almost all of the respondents (96.2%) felt the budget deficit was a very serious or serious problem and almost three-quarters (70.0%) felt this deficit affected their personal economic situation. Blame for the deficit was placed on Bush and the Congress. Finally, the majority of the respondents felt the federal government wastes a lot of money (84.8%).

A variety of questions were asked concerning federal programs and policies. The results are summarized below:

- Only 21.2% felt it very likely or fairly likely that the U.S. would be in a nuclear war within the next 10 years.

- 58.3% strongly agreed or agreed we should maintain levels of defense spending (65.3% for Republicans and 51.6% of Democrats).

- 70.7% felt the military commitment in the Middle East was justified.

- 63.7% thought the preferred action in the Middle East is to remain there until economic sanctions force Iraq to leave Kuwait. (69.6% for Republicans and 56.9% for Democrats).

Table 7

OPINIONS ON THE FEDERAL GOVERNMENT

| Question | Response (in percents) |
|---|---|
| You can trust the federal government in Washington to do what is right: | Just about always - 2.8<br>Most of the time - 17.3<br>Some of the time - 64.2<br>None of the time - 13.0<br>Don't know - 2.7 |
| The government in Washington is run: | By a few big interests - 78.0<br>For the benefit of all - 10.3<br>Undecided - 9.3<br>Don't know - 2.3 |
| Concerning the money we pay in taxes, the people in the federal government: | Waste a lot - 84.8<br>Waste some - 12.5<br>Don't waste much - 1.7<br>Don't know - 1.0 |
| Concerning the people in Washington, do you think: | Quite a few are crooked - 41.0<br>Not very many are crooked - 40.2<br>Hardly any are crooked - 11.5<br>Don't know - 7.3 |

- 64.6% strongly agreed or agreed the federal government should impose an oil import tax on foreign oil.

-93.3% strongly agreed or agreed that Gorbachev's leadership in the Soviet Union has greatly reduced tensions between that country and the U.S.

- However, only 25.8% strongly agreed or agreed we should provide economic aid to promote democracy in the Soviet Union.

- 50.3% strongly disagreed or disagreed that it should be the policy of U.S. government to provide affordable daycare for American families (60.7% for Republicans and 40.5% for Democrats).

- Only 27.4% felt the government war on drugs was effective.

In short, Wyoming's government was given a much more positive profile than the federal government in Washington.

Also of interest is the responses of those people polled to questions regarding controversial issues confronting Wyoming and the nation. Questions on gun control, prayer

in schools, and the death penalty were briefly touched upon with some interesting results.

Responses were not as clear cut concerning prayer in public schools. Respondents were split over whether or not to favor an amendment to the Constitution that would permit organized prayer in public schools (48.0% strongly agreed or agreed with such an amendment while 47.5% strongly disagreed or disagreed).

Almost two--thirds (64.5%) of the respondents agreed or strongly agreed that persons convicted of first degree murder should receive the death penalty. And, a little over half (56.3%) disagreed or strongly disagreed that the country would be better off if we had good gun control laws. Perhaps while Wyomingites don't believe in gun control, they do believe in punishing those who abuse the right to bear arms.

As commented earlier, those polled believe that Wyoming's economy has not improved over the last few years but that it will in the next 10. The individuals who expressed their opinion in this poll seemed to feel that a state run lottery might help this process along. Almost two-thirds (63.5%) favored the use of state-run lotteries to pay for services and programs provided by the Wyoming state government. Over half (53.5%) had bought lottery tickets from state-run lotteries in the past.

The survey results did show that Wyomingites have a strong sense of civic duty. Almost all of the people polled disagreed or strongly disagreed with the following statements:

- It isn't important to vote when you know your party doesn't have a chance to win (95.4%).

- Local elections aren't important enough to bother with (95.9%).

- So many people vote in national elections so it doesn't matter if I vote or not (95.2%).

While 72.7% of those polled actually voted, that seems to be the extent of their political activities. Only 12.3% had bought tickets or given money to help the campaign for one of the parties or candidates, only 13.8% had attended any political rallies or dinners, and only 10.5% had done any other work for one of the parties or candidates. A third (34.8%) had talked to people to try to show them why they should vote for one of the parties or candidates.

Conclusion

Wyoming's citizens are a very diversified group of individuals but they do agree on many things in general. They are optimistic about Wyoming's future and satisfied with its leaders. The same is not true of the federal government. A pervading feeling of mistrust was evident among many respondents. Wyomingites are willing to pay more in taxes provided that money is used wisely and provided the tax increases come in the form of "sin taxes".

The education system in Wyoming was given high marks. Both public schools and community colleges, as well as the University, were viewed positively in terms of the quality of their work.

In closing, a thank you to the 600 individuals who participated in this poll. Their opinions provided a look at Wyomingites' views in 1990.

Editor's note:

All the questions in the survey were not addressed in this paper. For a complete look at all the questions used in this paper, see Appendix 1.

Terry Haven
Editor
Wyoming Quarterly Update

## APPENDIX 1

Please rate the job the following public officials are doing. Is their performance excellent, good, fair, or poor.

| | Excellent | Good | Fair | Poor | Don't know |
|---|---|---|---|---|---|
| United States President George Bush? | 7.8 | 41.0 | 38.0 | 11.8 | 1.3 |
| Wyoming Governor Mike Sullivan? | 8.2 | 48.8 | 31.2 | 6.7 | 5.2 |
| Wyoming U.S. Senator Malcolm Wallop? | 5.5 | 34.8 | 30.8 | 18.8 | 10.8 |
| U.S. Senator Alan Simpson? | 13.7 | 40.8 | 25.8 | 12.3 | 7.3 |
| U.S. Congressman Craig Thomas? | 5.2 | 33.8 | 31.3 | 10.2 | 19.5 |

Are you registered to vote in the General Election?

Yes - 79.5
No - 20.2
Don't know - .3

If yes, are you registered as:

A Republican - 60.9
A Democrat - 32.1
An Independent/other - 6.9

Do you plan to vote in that General Election?

Yes - 80.8
No - 19.2

In the race for Governor, Democrat Michael Sullivan is running against Mary Mead, a Republican. If the election were held today, would you vote for:

Michael Sullivan - 51.0
Mary Mead - 26.2
Other Candidate - 1.2
Will not vote - .4
Undecided/don't know - 11.1

What about the Senate race? Republican Al Simpson is running against Kathy Helling, a Democrat. If the election were held today, would you vote for:

Kathy Helling - 22.7
Al Simpson - 64.5
Other Candidate - 1.9
Will not vote - .8
Undecided/don't know - 10.1

What about the Congressional election where Republican Craig Thomas is running against Pete Maxfield? If the election were held today, would you vote for:

Pete Maxfield - 29.9
Craig Thomas - 49.3
Other Candidate - .4
Will not vote - 1.0
Undecided/don't know - 19.4

How much of the time do you think you can trust the federal government in Washington to do what is right? Would you say:

Just about always - 2.8
Most of the time - 17.3
Some of the time - 64.2
None of the time - 13.0
Don't know - 2.7

Now for state government. How much of the time do you think you can trust the state government in Cheyenne to do what is right? Would you say:

Just about always - 6.5
Most of the time - 48.3
Some of the time - 39.7
None of the time - 2.2
Don't know - 3.3

Would you say the government in Washington is pretty much run by a few big interests looking out for themselves or that it is run for the benefit of all the people? Would you say it is run by a:

Few big interests - 78.0
For the benefit of all - 10.3
Or are you undecided - 9.3
Don't know - 2.3

Would you say the government in Cheyenne is pretty much run by a few big interests looking out for themselves or that it is run for the benefit of all the people? Would you say it is run by a:

Few big interests - 27.5
For the benefit of all - 57.2
Or are you undecided - 9.8
Don't know - 5.5

Do you think the people in the federal government waste a lot of money we pay in taxes, waste some of it, or don't waste very much of it?

Waste a lot - 84.8
Waste some - 12.5
Don't waste much - 1.7
Don't know - 1.0

Do you think the people in the state government waste a lot of money we pay in taxes, waste some of it, or don't waste very much of it?

Waste a lot - 19.7
Waste some - 56.5
Don't waste much - 17.0
Don't know - 6.8

Do you think that quite a few of the people running the government in Washington are a little crooked, not very many are crooked, or do you think hardly any of them are crooked?

Quite a few are crooked - 41.0
Not very many are crooked - 40.2
Hardly any are crooked - 11.5
Don't know - 7.3

Do you think that quate a few of the people running the state government in Cheyenne are a little crooked, not very many are crooked, or do you think hardly any of them are crooked?

Quite a few are crooked - 7.0
Not very many are crooked - 41.0
Hardly any are crooked - 43.2
Don't know - 8.8

How likely do you think the United States is to get into a nuclear war within the next 10 years? Would you say:

Very likely - 6.7
Fairly likely - 14.5
Fairly unlikely - 37.2
Very unlikely - 37.2
Don't know - 4.5

We are interested in how well people are getting along financially these days. During the last few years, has your financial situation been:

Getting better - 24.7
Getting worse - 33.8
Has it remained the same - 40.7
Don't know - .8

Looking ahead to the next year, do you think your financial situation will:

Get better - 27.5
Get worse - 21.7
Will it stay about the same - 47.2
Don't know - 3.7

Now let's talk about the country as a whole. Would you say that over the past year the nation's economy has gotten better, stayed the same or gotten worse?

Gotten better - 9.2
Stayed the same - 18.2
Gotten worse - 69.2
Don't know - 3.5

What about Wyoming? Would you say that over the past year Wyoming's economy has gotten better, stayed the same or gotten worse?

Gotten better - 17.8
Stayed the same - 38.7
Gotten worse - 39.8
Don't know - 3.7

Do you think the economy of this state will improve within the next couple of years, within the next five years, within the next ten years, or may never improve?

Next couple - 22.7
Next five years - 45.5
Next ten years - 14.8
May never - 7.7
Don't know - 9.3

Some people say the federal budget deficit is a serious problem for the nation's economy. Others say the deficit may become a serious problem in the future, but that it is not one now. How about you? Do you think the deficit is:

A very serious problem - 66.2
A serious problem - 30.0
A minor problem - 1.7
Not a problem at this time - 1.2
Don't know - 1.0

Does the federal budget deficit affect your personal economic well being and standard of living?

Yes - 70.0
No - 25.3
Don't know - 4.7

President Bush and Congressional leaders have blamed each other for the size of the federal budget deficit. Who do you think is chiefly responsible? Is it the Bush administration, the Congress or are the President and Congress equally to blame?

President Bush - 3.8
Congress - 28.7
Equally to blame - 60.7
Electorate - .8
Reagan - .8
Don't know - 5.2

Considering all the public services provided to you by state and local government programs, and considering all the taxes you pay, do you think state and local taxes in Wyoming are <u>generally</u> reasonable or do you think they are <u>too high</u>?

Generally reasonable - 89.8
Too high - 8.2
Don't know - 2.0

Do you recall <u>ever</u> buying a lottery ticket from a state-run lottery?

Yes - 53.5
No - 46.3
Don't know - .2

If yes:

Did you purchase one during the last month?
Yes - 22.7
No - 77.3

About how many dollars did you spend on lottery tickets last month?

$1 - $5 - 52.1
$6 - $10 - 17.8
Over $10 - 30.1

Did you win anything?

No money - 53.4
$1 - $5 - 20.5
$6 - $10 - 12.3
$11 - $100 - 9.6
Over $100 - 4.1

As you may know, a number of states use lotteries, in addition to tax monies, to pay for some public programs and services.

Some people in Wyoming think this would be a good way to raise new money for education, state parks and social programs. Others think revenue for public services should come from tax sources rather than a form of legalized, state-sponsored gambling.

What about you? Do you favor or oppose the use of state-run lotteries to pay for programs and services provided by Wyoming state government, or don't you have an opinion on this?

Favor - 63.5
Oppose - 25.5
No opinion - 8.7
Don't know - 2.3

Here is a question about state spending. As I read off a list of areas where state government does spend money, please tell me if you would increase state spending, leave it at present levels or decrease state spending.

| | More | Same | Less | Don't know |
|---|---|---|---|---|
| Law enforcement & corrections | 42.2 | 47.2 | 5.5 | 5.2 |
| Local public schools | 58.0 | 34.8 | 3.8 | 3.3 |
| Community colleges | 51.0 | 39.0 | 3.7 | 6.3 |
| Streets and highways | 31.7 | 60.7 | 5.5 | 2.2 |
| University of Wyoming | 51.3 | 34.8 | 4.5 | 9.3 |
| State economic development | 48.8 | 33.3 | 8.8 | 9.0 |
| Water Development | 48.0 | 39.5 | 4.3 | 8.2 |
| Health and social services | 50.0 | 36.5 | 9.5 | 4.0 |

You indicated that you thought the state should spend for (LIST ITEMS RESPONDENT WISHES MORE SPENDING ON). Would you be willing to have state taxes increased to cover these spending increases?

Yes - 76.4
No - 19.5
Don't know - 4.2

It is generally agreed that next year income from current taxes will not cover the cost of existing state programs. If taxes had to be increased, which of the following taxes would you favor increasing and which would you oppose.

| | Favor | Oppose | Don't know |
|---|---|---|---|
| Cigarettes | 78.7 | 18.8 | 2.5 |
| Gasoline | 27.7 | 70.3 | 2.0 |
| Beer | 81.0 | 17.0 | 2.0 |
| Sales tax | 55.0 | 42.3 | 2.7 |
| Property tax | 21.5 | 75.0 | 3.5 |
| Hard liquor | 85.0 | 13.2 | 1.8 |
| Wine | 83.8 | 14.3 | 1.8 |
| Severance | 38.7 | 43.2 | 18.2 |

I would like to read you several statements. Please tell me if you strongly agree (SA), agree (A), disagree (D), or strongly disagree (SD).

| | SA | A | D | SD | Don't know |
|---|---|---|---|---|---|
| The United States should maintain present levels of spending for defense. | 10.5 | 47.8 | 33.0 | 7.3 | 1.3 |
| It should be the policy of the United States Government to provide affordable daycare for all American families. | 9.2 | 35.2 | 43.8 | 6.5 | 5.3 |
| The United States Government war on drugs has been effective. | 1.7 | 25.7 | 54.0 | 13.2 | 5.5 |
| The federal government should impose an import tax on oil from foreign countries. | 9.3 | 55.3 | 19.7 | 2.2 | 13.5 |
| The University should reduce the number of degree programs available to students. | .7 | 8.7 | 63.0 | 17.7 | 10.0 |
| In general, the University has steadily improved during the last several years. | 3.0 | 55.8 | 15.8 | 1.3 | 24.0 |

| | SA | A | D | SD | Don't know |
|---|---|---|---|---|---|
| Gorbachev's leadership in the Soviet Union has greatly reduced tensions between that country and the United States. | 32.8 | 60.5 | 4.5 | .5 | 1.7 |
| The country would be better off if we had good gun control laws. | 8.5 | 29.2 | 40.5 | 15.8 | 6.0 |
| I favor an amendment to the United States Constitution that would permit organized prayers in public schools. | 6.5 | 41.5 | 39.8 | 7.7 | 4.5 |
| The United States should provide economic aid to promote democracy in the Soviet Union. | .8 | 25.0 | 58.7 | 7.5 | 8.0 |
| State spending for economic development has effectively improved Wyoming's economy. | .7 | 32.7 | 43.2 | 6.2 | 17.3 |
| Reducing Wyoming's severance tax level would promote economic development in the state. | .8 | 31.0 | 38.3 | 1.8 | 28.0 |
| There is very little that Wyoming state government can do about Wyoming's depressed economy. | .5 | 16.0 | 62.5 | 14.5 | 6.5 |
| Persons convicted of first degree murder should receive the death penalty. | 14.3 | 50.2 | 22.5 | 3.0 | 10.0 |
| The University of Wyoming should play a role in the development of the state's economy. | 7.5 | 68.5 | 7.2 | 0 | 12.0 |

Students are often given grades A, B, C, D and F for the quality of their work. Suppose the public schools in your community were graded in the same way. What grade would you give your local public school?

A - 26.2 B - 42.0 C - 15.7 D - 5.0 F - 1.3
Don't know - 9.8

What about the state's community colleges? What grade would you give them?

A - 19.2 B - 43.5 C - 10.8 D - 1.7 F - .3
Don't know - 24.5

What about the University of Wyoming? What grade would you give the University for the quality of its work?

A - 24.3 B - 46.0 C - 9.7 D - 1.7 F - .3
Don't know - 18.0

Here is a question about American foreign policy. In response to the Iraqi invasion of Kuwait, the United States has moved over 150,000 military personnel to the Middle East. In your opinion, was the United States justified in making this military commitment?

Yes, justified - 70.7
No, not justified - 21.2
Don't know - 8.2

Assuming that Iraq does not attack United States forces, the United States could follow several courses of action. Among these courses of action are:

- withdraw immediately - 11.2
- drive Iraq out of Kuwait with the use of military force - 17.2
- remain in the Middle East until economic sanctions force Iraq to withdraw from Kuwait - 63.7
- Don't know - 8.0

## WYOMING ELECTION YEAR SURVEY CALL BACKS

In talking with people about the election, we find that a lot of people were not able to vote because they were sick, or they didn't have time, or because they were not registered. How about you? Did you vote in the November 6th election or did something keep you from voting?

Yes - 72.7 No - 27.3

In the U.S. Senatorial race, did you vote for:

Kathy Helling - 28.2
Al Simpson - 67.3
Another candidate - 1.0

Did you not vote in this race - 1.7
Don't know - 1.7

In the U.S. House race, did you vote for:

Pete Maxfield - 38.0
Craig Thomas - 60.3
Another candidate - .2

Did you not vote in this race - .7
Don't know - .7

In the Governor's race, did you vote for:

Mike Sullivan - 70.5
Mary Mead - 28.0

Did you not vote in this race - 1.0
Don't know - .5

NOW WE WANT TO KNOW HOW MUCH PEOPLE PARTICIPATED IN POLITICAL ACTIVITIES IN THE 1990 POLITICAL CAMPAIGN.

Did you buy any tickets or give money to help the campaign for one of the parties or candidates?

Yes - 12.3 No - 86.8 Don't know - .9

Did you go to any political meetings, rallies, dinners, or things like that?

Yes - 13.8 No - 85.8 Don't know - .4

Did you do any other work for one of the parties or candidates?

Yes - 10.5 No - 89.2 Don't know - .4

Did you talk to any people to try to show them why they should vote for one of the parties or candidates?

Yes - 34.8 No - 65.0 Don't know - .2

WE WOULD LIKE TO KNOW WHETHER YOU AGREE OR DISAGREE WITH EACH OF THESE FOUR STATEMENTS.

It isn't important to vote when you know your party doesn't have a chance to win. Do you:

Strongly agree - .5
Agree - 2.7
Disagree - 49.6
Strongly disagree - 45.8
Don't know/other - 1.4

Many local elections aren't important enough to bother with.

Strongly agree - 3.2
Agree - 55.3
Disagree - 40.6
Don't know/other - .9

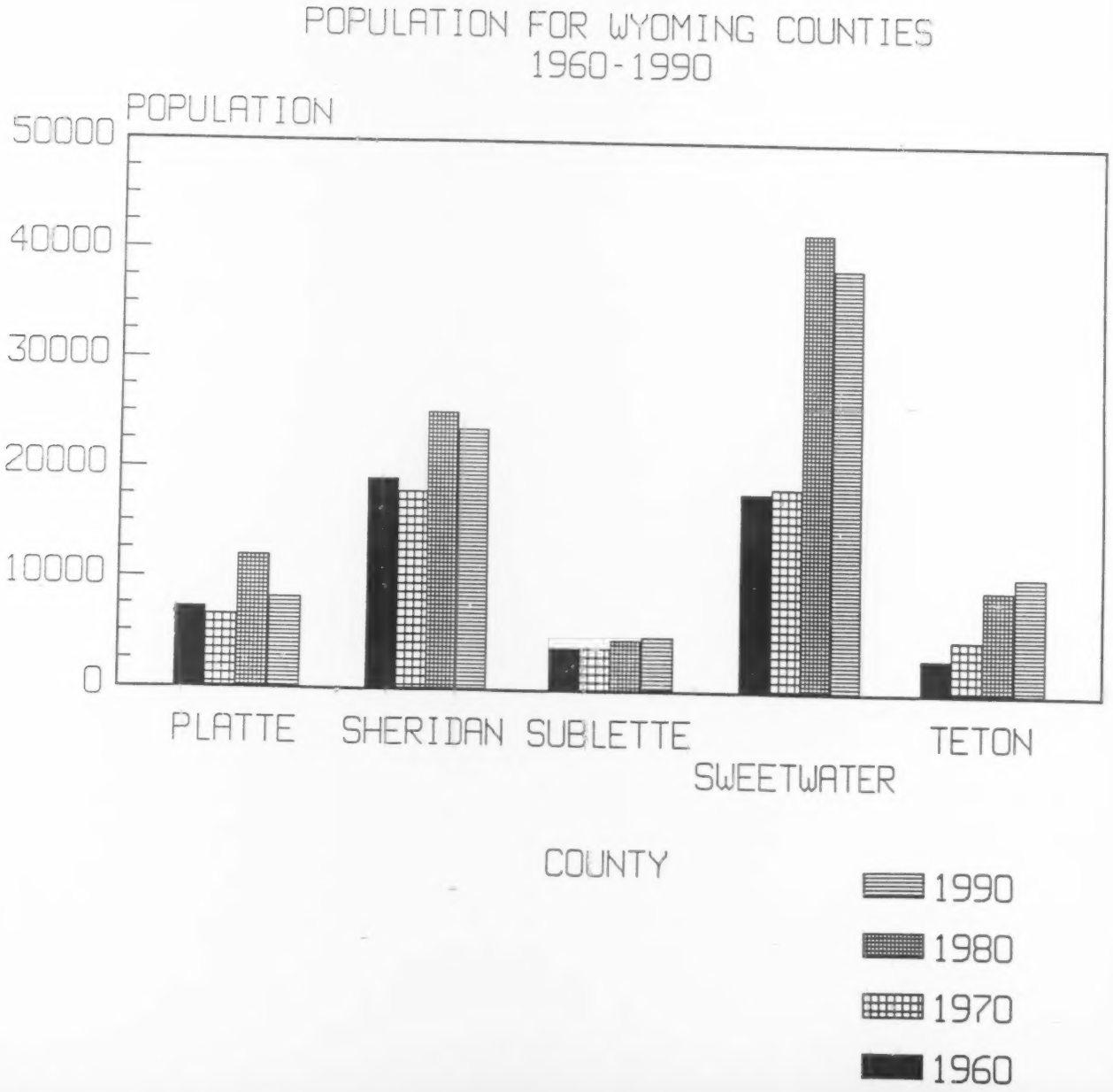
So many people vote in the national elections that it doesn't matter much to me whether I vote or not.

Agree - 3.7
Disagree - 56.9
Strongly disagree - 38.3
Don't know/other - 1.1

If a person doesn't care how an election comes out he or she shouldn't vote in it.

Strongly agree - 1.1
Agree - 19.6
Disagree - 57.2
Strongly disagree - 13.8
Don't know/other - 8.3

# Economic Changes

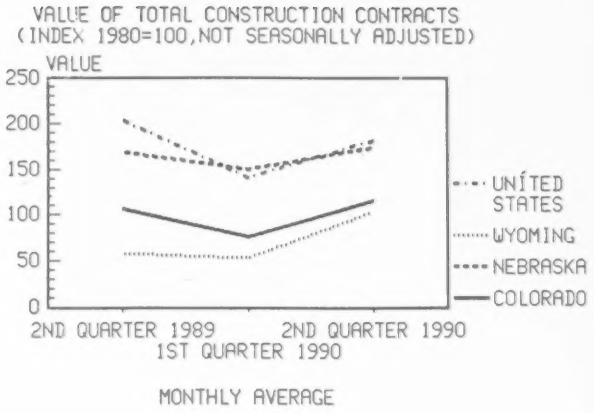


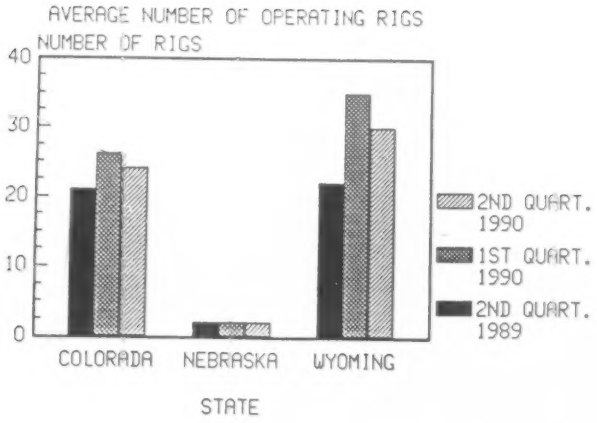
## Economic Changes

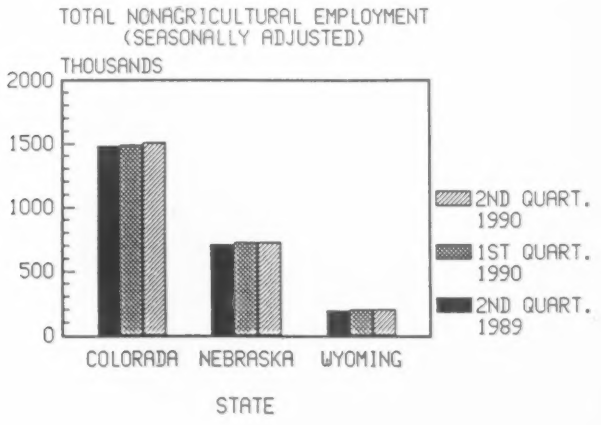
Data for these tables is taken from the Regional Economic Digest published by the Federal Reserve Bank of Kansas City. Information for this publication is for the Tenth Federal Reserve District which includes Colorado, Kansas, Western Missouri, Nebraska, Northern New Mexico, Oklahoma, and Wyoming.

The Third Quarter 1990 edition indicates an improvement in the energy sector, citing a nearly 4% increase in the average number of drilling rigs operating in the district for the second quarter. More over, the district rig count is almost 17% higher than a year ago.

The district construction indicators were not as optimistic. Despite the 27% increase from 1st to 2nd Quarter 1990, the value of construction contracts awarded in the 2nd quarter was still lower than a year ago.



# State Data

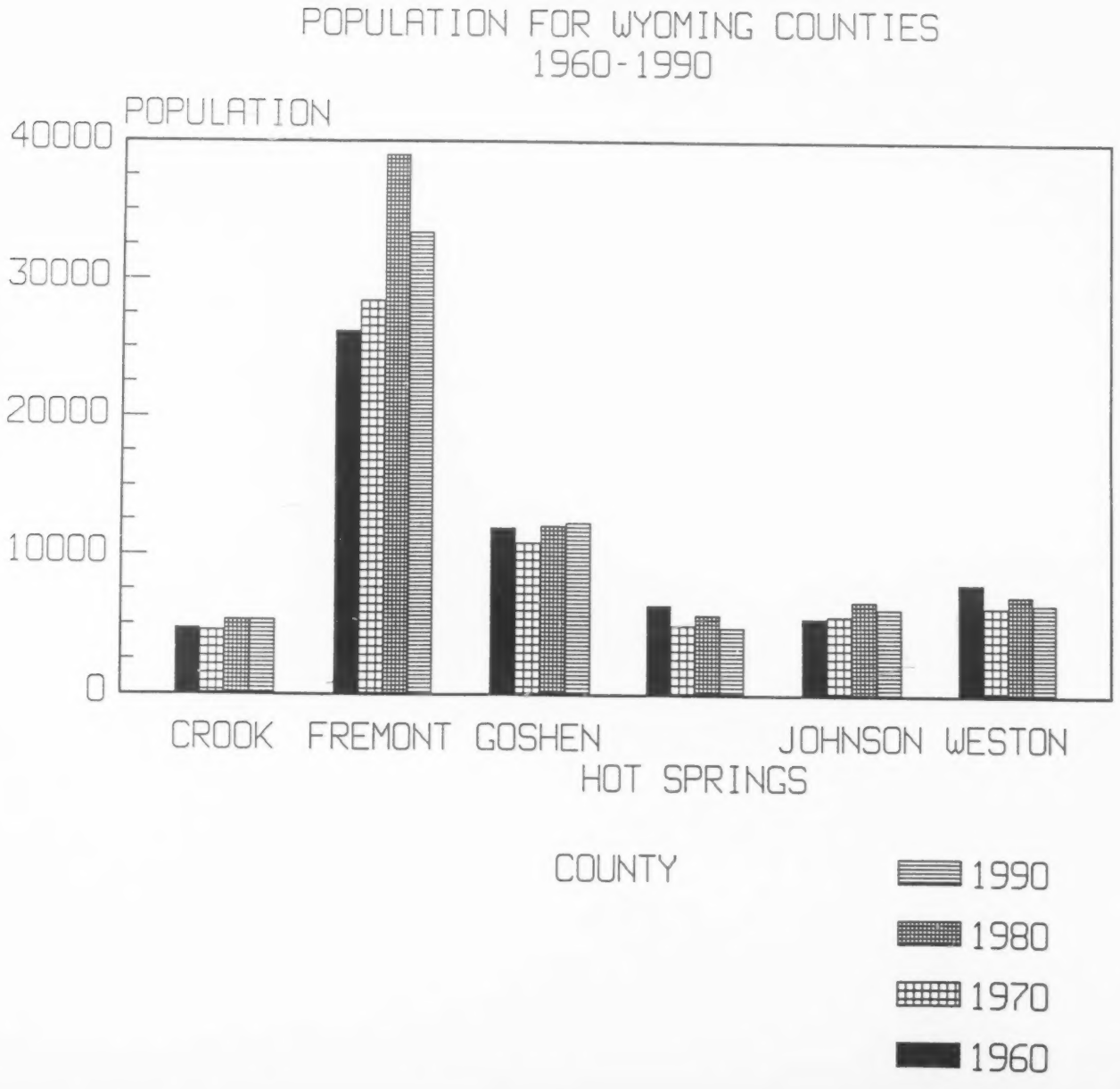

POPULATION FOR WYOMING COUNTIES
1960-1990
POPULATION
40000
30000
20000
10000
0
CROOK
FREMONT
GOSHEN
HOT SPRINGS
JOHNSON
WESTON
COUNTY
1990
1980
1970
1960

Table 1: Agriculture[1]

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Timber Cut in Wyoming National Forests (MBF) | 75482. | 28080. | 5860. | 39416. | 54863. | 23488. | 6218. | 37522. | 46222. | 26418. | 65442. | INA |
| Price Indices[2] (1967=100) | | | | | | | | | | | | |
| 2. Wyoming Crops, Prices Received-Latest | 218. | 218. | 244. | 323. | 322. | 349. | 363. | 313. | 323. | 337. | 347. | 263. |
| 3. Wyoming Crops, Prices Received-Average | 218. | 217. | 234. | 302. | 323. | 344. | 362. | 336. | 317. | 327. | 346. | 313. |
| 4. U.S. Crops, Prices Received-Latest | 216. | 212. | 249. | 260. | 262. | 266. | 275. | 243. | 241. | 258. | 301. | 236. |
| 5. U.S. Crops, Prices Received-Average | 217. | 214. | 230. | 262. | 260. | 264. | 273. | 251. | 245. | 263. | 271. | 243. |
| 6. Wyoming, All Commodities, Prices Received-Latest | 268. | 301. | 260. | 313. | 292. | 324. | 301. | 310. | 297. | 322. | 313. | 301. |
| 7. Wyoming, All Commodities, Prices Received-Average | 273. | 294. | 280. | 295. | 300. | 311. | 308. | 311. | 304. | 314. | 315. | 303. |
| 8. U.S. All Commodities, Prices Received-Latest | 232. | 237. | 253. | 264. | 265. | 274. | 270. | 262. | 270. | 281. | 277. | 271. |
| 9. U.S., All Commodities, Prices Received-Average | 235. | 238. | 246. | 263. | 263. | 275. | 271. | 265. | 267. | 278. | 278. | 274. |
| 10. Wyoming Livestock, Prices Received-Latest | 283. | 325. | 265. | 310. | 283. | 316. | 283. | 308. | 290. | 318. | 303. | 313. |
| 11. Wyoming Livestock, Prices Received-Average | 289. | 317. | 294. | 293. | 293. | 309. | 292. | 300. | 300. | 315. | 306. | 300. |
| 12. U.S. Livestock, Prices Received-Latest | 248. | 260. | 257. | 268. | 269. | 281. | 264. | 279. | 296. | 302. | 250. | 303. |
| 13. U.S. Livestock, Prices Received-Average | 252. | 259. | 259. | 264. | 267. | 284. | 269. | 278. | 287. | 293. | 282. | 302. |
| 14. Prices Paid by U.S. Farmers-Average | 335. | 339. | 348. | 352. | 354. | 359. | 361. | 361. | 365. | 281. | 372. | 380. |

[1] First time readers of WQU should refer to the "Format" page (in back) for an explanation of abbreviations and table formats.
[2] The index for the last month (latest) of each quarter, along with the average of the three monthly indices of each quarter.

Sources: Series 1: United States Forest Service. "Timber Cut and Sold, Convertible Products." Region 2 and 4 reports published quarterly.
Series 2-15: Wyoming Crop and Livestock Reporting Service. Bi-weekly Ag Statistics.

Table 2: Banking and Finance

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total Bank Loans and Leases Financing Receivables (T$) | 1765203. | 1733754. | 1787542. | 1777474. | 1758410. | 1740029. | 1793438. | 1787592. | 1782338. | 1848557. | 1944633. | NA |
| 2. Total Bank Deposits (T$) | 3792473. | 3671572. | 3705311. | 3712403. | 3753325. | 3623495. | 3621158. | 3633097. | 3838374. | 3768344. | 3864849. | NA |
| 3. Total Non-Interest-Bearing Deposits (T$) | 603809. | 531243. | 564608. | 572367. | 577610. | 525702. | 549281. | 559276. | 648397. | 542168. | 555941. | NA |
| 4. Savings and Loan Mortgage Loans (T$)[1] | 772721. | 744492. | 740954. | 726300. | 711602. | 719240. | 696415. | 617166. | 636718. | 431583. | 418552. | NA |
| 5. Savings and Loan Deposits (T$) | 1137196. | 1119558. | 1107268. | 1107961. | 1070072. | 1032814. | 988180. | 952120. | 962666. | 945644. | 908386. | NA |
| 6. Prime Interest Rate[2] | 8.75 | 8.50 | 9.00 | 10.00 | 10.50 | 11.50 | 11.07 | 10.50 | 10.50 | 10.0 | 10.0 | 10.0 |

[1]Only members of the Federal Home Loan Bank Board are included. Indicates amount at the end of the quarter.
[2]Prime rate charged by banks on short-term business loans. Rate is for last month of the quarter.

Sources: Series 1-3: Office of the State Examiner of Wyoming, Abstract Report of State and National Banks in Wyoming, Published Quarterly.
Series 4 and 5: Federal Home Loan Bank of Seattle, Monthly Report. Comparative statistical analysis of member institutions.
Series 6: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 3: Business Conditions

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Domestic Corporations | 254. | 300. | 298. | 246. | 221. | 284. | 302. | 236. | 276. | 316. | 355. | 353. |
| 2. New Foreign Corporations | 229. | 208. | 196. | 208. | 232. | 210. | 249. | 196. | 208. | 196. | 262. | 214. |
| 3. Total New Corporations | 483. | 508. | 494. | 454. | 453. | 484. | 551. | 432. | 484. | 512. | 617. | 567. |
| 4. Business Failures | 53. | 75. | 52. | 34. | 32. | 31. | 30. | 24. | 25. | 31. | 28. | 19. |
| 5. Value of Business Failures ($) | 14181020. | 11499022. | 3906790. | 28339514. | 36551338. | 3120102. | 7852143. | 3591064. | 1998791. | 2914000. | 5578685. | 2072828. |
| 6. Personal Bankruptcies | 303. | 271. | 351. | 306. | 306. | 274. | 336. | 287. | 285. | 237. | 362. | 252. |

Sources: Series 1-3: Secretary of State. New and Foreign Corporations. Monthly report.
Series 4-6: Cheyenne Credit Bureau. Wyoming bankruptcy cases, business failures, and value of failures. Weekly publication.

Table 4: Construction

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Residential Dwelling Units | 297. | 304. | 449. | 359. | 291. | 233. | 289. | 401. | 264. | 394. | 317. | 614. |
| 2. Value of Residential Dwellings Constructed (M$) | 34.3 | 23.5 | 37.3 | 31.3 | 22.6 | 18.2 | 25.0 | 34.7 | 23.8 | 34.7 | 31.3 | 54.8 |
| 3. Value of Nonresidential Construction (M$) | 18.2 | 4.2 | 35.2 | 6.9 | 10.2 | 10.9 | 17.1 | 23.6 | 20.7 | 15.5 | 39.4 | 30.2 |
| 4. Building Permits Issued in Selected Wyoming Cities | 2451. | 1489. | 2763. | 2220. | 2082. | 1578. | 2806. | 2663. | 1996. | 1695. | 2634. | 2558. |
| 5. Value of Authorized Construction (T$) | 13633. | 15559. | 25330. | 21878. | 18071. | 8866. | 24528. | 22760. | 27343. | 16011. | 37542. | 29331. |
| 6. Mortgage Interest Rate[1] | 8.78 | 8.77 | 8.72 | 8.90 | 9.03 | 9.66 | 10.09 | 9.87 | 9.70 | 9.70 | 9.80 | 9.60 |

[1]Conventional first mortgage for new home purchase. U. S. average for last month of quarter.

Sources: Series 1-3: F.W. Dodge Division of McGraw-Hill. "Dodge Local Construction Potentials." Published monthly.
Series 4-5: Survey Research Center. "Local Construction Reports." Survey of authorized construction in selected cities conducted monthly.
Series 6: U. S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 5: Consumers

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Truck Registrations | 3391. | 2867. | 3508. | 3203. | 3227. | 3086. | 3734. | 3775. | 3344. | 3474. | 3697. | 2986. |
| 2. New Car Registrations | 3027. | 2736. | 3147. | 2969. | 2849. | 2538. | 3341. | 3412. | 2409. | 2352. | 2607. | 2438. |
| 3. Wyoming Personal Income (M$) | 6394. | 6390. | 6638. | 6624. | 6665. | 6770. | 6830. | 6903. | 7034. | 7144. | 7223. | NA |
| 4. U.S. Disposable Income (B$) | 3316. | 3376. | 3422. | 3512. | 3587. | 3690. | 3748. | 3807. | 3871. | 3888. | 3926. | 3969. |
| 5. U.S. Personal Income (M$) | 3887349. | 3940129. | 4022465. | 4095777. | 4176250. | 4287087. | 4347177. | 4385348. | 4452904. | 4546227. | 4605604. | NA |
| 6. Latest U.S. Consumer Price Index (1982-1984=100)[1] | 114.2 | 115.1 | 116.7 | 118.5 | 119.2 | 120.8 | 122.8 | 123.6 | 124.6 | 127.1 | 128.3 | 131.1 |
| 7. Quarter's Average U.S. CPI | 114.2 | 114.8 | 116.7 | 117.8 | 119.5 | 120.2 | 122.4 | 123.3 | 124.4 | 127.5 | 127.7 | 129.9 |
| 8. Liquor Sales (T$) | 8379. | 5679. | 6714. | 7041. | 8368. | 5530. | 6747. | 7269. | 7746. | 5729. | 7036. | 7916. |

[1]Number shown is for the last month of the quarter. CPI shown is the index for wage earners and clerical workers.

[2]Beginning January 1987, the consumer price index, previously expressed on a base of 1967=100, has been rebased to 1982-84=100. Selection of the 1982-84 period was made to coincide with the updated expenditure weights, which are based upon data tabulated from the Consumer Expenditure Surveys for 1982, 1983, and 1984. Historical data on the new base or additional information regarding these changes is available from the Bureau of Labor Statistics, Washington, D.C. 20212.

Sources: Series 1-2: R.L. Polk and Company Motor Statistical Division. "National New Vehicle Registration Service." Published monthly.
Series 3,4: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published quarterly.
Series 5,6,7: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.
Series 8: Wyoming Liquor Commission. Sales data are reported to SRC.

Table 6: Employment and Labor[1]

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Civilian Labor Force | 230684. | 228734. | 232589. | 235250. | 231426. | 235106. | 238973. | 242749. | 224793. | 234724. | 245354. | 245287. |
| 2. Employment | 214312. | 209923. | 219454. | 222072. | 216552. | 217688. | 224543. | 228035. | 212196. | 223852. | 233190. | 235389. |
| 3. Unemployment | 16371. | 18811. | 13135. | 13178. | 14874. | 17418. | 14431. | 14714. | 12597. | 10871. | 12164. | 9899. |
| 4. Unemployment rate | 7.1 | 8.2 | 5.6 | 5.6 | 6.4 | 7.4 | 6.0 | 6.1 | 5.6 | 4.6 | 5.0 | 4.0 |
| 5. Initial Claims Filed | 9983. | 10949. | 6888. | 5376. | 9704. | 10334. | 6508. | 4621. | 8659. | 9220. | 5673. | 4682. |
| 6. Miners' Average Weekly Hours | 45.4 | 42.9 | 43.6 | 43.4 | 42.7 | 46.3 | 34.8 | 45.2 | 44.0 | 43.8 | 33.9 | 46.2 |
| 7. Miners' Average Weekly Pay ($) | 637.42 | 625.72 | 533.42 | 619.70 | 627.33 | 678.68 | 651.62 | 656.60 | 617.15 | 660.70 | 684.52 | 685.37 |
| 8. Miners' Average Hourly Wage ($) | 14.04 | 14.60 | 12.23 | 14.29 | 14.68 | 14.67 | 18.73 | 14.54 | 14.02 | 15.08 | 20.19 | 14.83 |

[1]The most recent year's data are preliminary.

Sources: Series 1-11: Wyoming Employment Security Commission. Labor Force Trends. Published monthly.

Table 7: Energy and Mineral Production

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Wyoming Coal (TST) | 38831. | 37323. | 39016. | 42883. | 41013. | 41874. | 40469. | 41114. | 41629. | 45139. | INA | INA |
| 2. U.S. Coal (TST) | 246314. | 231473. | 225968. | 239046. | 227754. | 249267. | 238251. | 236713. | 250209. | 261688. | INA | INA |
| 3. Wyoming Oil (TBPD) | 317. | 320. | 317. | 306. | 299. | 302. | 299. | 291. | 294. | 292. | 289. | 284. |
| 4. U.S. Oil (TBPD) | 8347. | 8304. | 8216. | 8033. | 7984. | 7753. | 7701. | 7529. | 7560. | 7459. | 7275. | 7150. |
| 5. Wyoming Natural Gas (MMCFD)[1] | 1203. | 1430. | 1339. | 1135. | 1455. | 1953. | 1274. | 1340. | 1820. | 1837. | INA | INA |
| 6. U.S. Natural Gas (MMCFD) | 49241. | 50768. | 46453. | 44547. | 48982. | 48936. | 46397. | 44527. | 47876. | 50073. | 48606. | INA |
| 7. Active Rig Counts in Wyoming-Average | 61. | 40. | 33. | 43. | 31. | 20. | 22. | 43. | 50. | 34. | 31. | 44. |

[1]Beginning with fourth quarter 1986, Wyoming gas includes carbon dioxide production.

Sources: Series 1,2,5, and 6: U. S. Department of Energy. Energy Data Reports. Gas data are from Natural Gasy Monthly, and the Wyoming Oil and Gas Conservation Commission. Coal data are published weekly.
Series 3-4: The Oil and Gas Journal. U.S. and Wyoming Oil Production. Published weekly.
Series 7: Petroleum Information Corporation, Hughes Tool Company. Monthly Average Active Rig Counts in Wyoming.

Table 8: Government

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sales and Use Tax Collections (T$) | 47115. | 42585. | 42769. | 49721. | 46445. | 41823. | 42966. | 53145. | 54618. | 51699. | 50077. | 61744. |
| 2. Violent Crime[1] | 354. | 354. | 371. | 431. | 308. | 310. | 278. | 323. | 307. | 301. | INA | INA |
| 3. Nonviolent Crime[2] | 4420. | 3713. | 4562. | 4662. | 3917. | 3565. | 4423. | 4704. | 4138. | 3800. | INA | INA |
| 4. Stolen Property (T$) | 2199. | 1770. | 1986. | 2467. | 2272. | 2040. | 2617. | 2200. | 1894. | 2151. | INA | INA |
| 5. Stolen Property Recovery Rate | 34.1 | 42.2 | 43.1 | 35.5 | 36.0 | 42.8 | 30.5 | 44.0 | 36.7 | 46.3 | INA | INA |
| 6. Percent of Crimes Cleared[3] | 34.5 | 33.7 | 28.3 | 30.9 | 40.0 | 33.0 | 27.5 | 27.1 | 29.5 | 35.2 | INA | INA |

[1]Murder, negligent homicide, forcible rape, robbery, aggravated assault.

[2]Burglary, larceny, auto theft.

[3]Clearance of a crime indicates resolution of a complaint by arrest or other extraordinary means.

Sources: Series 1: Wyoming Department of Revenue and Taxation, Sales and Use tax Division. "Net Collections by Business Class by County."

Series 2-6: Uniform Crime Reporting Center for Criminal Justice Research, Division of Criminal Identification, Office of the State Attorney General. "Crime in Wyoming." Published quarterly.

Table 9: Tourism

| Calendar Quarter | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Visitors, National Parks and Monuments | | | | | | | | | | | | |
| 1. Yellowstone | 168613. | 83736. | 649842. | 1268270. | 216076. | 82542. | 720021. | 1724290. | 153523. | 79552. | 761664. | 1857973. |
| 2. Grand Teton | 264932. | 144982. | 624400. | 1083754. | 223562. | 211180. | 665734. | 1361210. | 302539. | 170799. | 680593. | 1544479. |
| 3. Devil's Tower | 17980. | 7121. | 109993. | 222877. | 20702. | 8064. | 120589. | 229668. | 19106. | 8251. | 119264. | 279985. |
| 4. Fossil Butte | 1072. | 286. | 5894. | 13838. | 1195. | 224. | 5565. | 13192. | 1452. | 195. | 6692. | 25244. |
| 5. Fort Laramie | 4437. | 1172. | 24384. | 49631. | 4145. | 1475. | 20488. | 40697. | 3007. | 1505. | 21869. | 41037. |
| 6. Big Horn NRA-South[1] | 40782. | 30045. | 60727. | 58820. | 35558. | 14293. | 47417. | 62160. | 185172. | 15664. | 102821. | 70249. |
| Other Tourism Indicators | | | | | | | | | | | | |
| 7. Traffic count (Avg. number of Vehicles/Day) | 113385. | 88529. | 142830. | 178675. | 118023. | 113409. | 146663. | 184209. | 118130. | 105793. | 159830. | 206100. |
| 8. Hotel, Motel, and Camp Sales Tax (T$) | 1871. | 947. | 1050. | 2106. | 1929. | 950. | 1013. | 1962. | 1951. | 991. | 1135. | 2731. |
| 9. Gasoline Sales (TGL) | 71190. | 62295. | 81811. | 96106. | 70784. | 61807. | 78869. | INA | INA | INA | INA | INA |

[1]Big Horn Canyon N.R.A. is only partially in Wyoming. Only visitation for the Wyoming part is shown.

Sources: Series 1-6: Monthly visitor use reports of the National Park Service.
Series 7: Traffic Survey Unit - Planning Branch, Wyoming State Highway Department. "Selected Recording Stations Traffic Counter Data." Published monthly.
Series 8: Wyoming Department of Revenue and Taxation. "Sales and Use Tax Summary by County by SIC Major and Minor." Reported monthly.
Series 9: Petroleum Association of Wyoming. Monthly Gasoline Gallonage Report.

Table 10: Utilities[1]

| Calendar Quarters | 4/87 | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Residential Electric Connections | 175879. | 175896. | 176333. | 177122. | 176457. | 175841. | 175589. | 175485. | 176197. | 174439. | 179163. | 176520. |
| 2. Residential Electric Consumption (TKWH) | 399068. | 505669. | 351036. | 301098. | 401776. | 688891. | 348577. | 296588. | 418463. | 488454. | 351960. | 304197. |
| 3. Commercial Electric Connections | 33780. | 33602. | 33722. | 33846. | 33756. | 33928. | 33997. | 34038. | 140722. | 34036. | 34278. | 34370. |
| 4. Commercial Electric Consumption (TKWH) | 416675. | 456190. | 420630. | 425495. | 426766. | 467697. | 414902. | 428705. | 449339. | 457875. | 447084. | 469100. |
| 5. Industrial Electric Connections | 2764. | 2760. | 2748. | 2921. | 2872. | 2972. | 3104. | 3143. | 3084. | 3203. | 3507. | 3535. |
| 6. Industrial Electric Consumption (TKWH) | 1819191. | 1788103. | 1815370. | 1720051. | 1847617. | 1812799. | 1923513. | 1790624. | 1968557. | 1990072. | 1919833. | 1796303. |
| 7. Other Connections[2] | 2680. | 2965. | 3690. | 3899. | 3404. | 3349. | 7440. | 4573. | 4091. | 4675. | 4198. | 4280. |
| 8. Other Consumption (TKWH) | 16355. | 10451. | 24283. | 64994. | 13221. | 9051. | 41364. | 102572. | 59012. | 57146. | 57187. | 94327. |
| 9. Residential Natural Gas Connections | 72654. | 74286. | 73935. | 90673.[3] | 93300. | 100074. | 99535. | 97665. | 90066. | 90456. | 90223. | 89853. |
| 10. Residential Natural Gas Consumption (MCF) | 2274494. | 4310738. | 2042533. | 826220.[3] | 2521850. | 5786697. | 2436947. | 871763. | 2454142. | 4537105. | 2321660. | 760692. |
| 11. Commercial Natural Gas Connections | 6520. | 6643. | 6560. | 8357.[3] | 9398. | 9422. | 9289. | 10514. | 18913. | 19028. | 18910. | 18928. |
| 12. Commercial Natural Gas Consumption (MCF) | 997247. | 1939461. | 957241. | 475106.[3] | 1349515. | 2981071. | 1283967. | 631348. | 1818451. | 3305106. | 1702262. | 614511. |
| 13. Industrial Natural Gas Connections | 87. | 88. | 90. | 90. | 78. | 85. | 82. | 80. | 79. | 73. | 73. | 71. |
| 14. Industrial Natural Gas Consumption (MCF) | 828532. | 3249154. | 482088. | 2324709. | 2504087. | 3069267. | 1977830. | 2279086. | 2611580. | 3019329. | 2774710. | 1810840. |
| 15. Other Natural Gas Connections | 35. | 39. | 36. | 35. | 34. | 36. | 36. | 34. | 33. | 29. | 32. | 38. |
| 16. Other Natural Gas Consumption (MCF) | 6988. | 12922. | 1920. | 7488. | 232. | 1216. | 4344. | 10405. | 312. | 138. | 2309. | 1138300.[4] |

[1]Some small utilities do not report, hence the data are slightly less than actual state totals. The data are consistent. The same utilities' reports are included in each figure.

[2]"Other" includes agriculture, municipal, and other public.

[3]Starting with third quarter, 1988, the figures for Residential and Commercial Natural Gas Connections and Residential and Commercial Natural Gas Consumption reflect the merger of Northern Gas Division, Northern Utilities Division, and Northern Mountain Gas Company now doing business as Northern Gas of Wyoming.

[4]Starting with third quarter, 1990, Mountain Fuel Supply included gas transported by their company for another company in the "other" category.

## FORMAT

For data available at least quarterly, the last 12 quarters are printed in **WQU**. In this edition, published series begin with the 4th quarter of 1987, and end with the 3rd quarter of 1990. For other data series (primarily annual), the most recent observations, up to 12, are published in **WQU**. Quarters are calendar quarters. For example, the 4th quarter is composed of October, November and December. In the table headings and narratives, a particular quarter will be indicated by notation such as 4/87 (4th quarter, 1987), 1/88 (1st quarter, 1988), and so on.

Beside each data series name is an abbreviation in parenthesis. The abbreviation indicates the units (such as dollars, tons, feet, miles, etc.) of the data. The key to the units abbreviations is below.

Throughout **WQU**, all data are for the State unless otherwise stated. The most recent year's data should be viewed as preliminary, due to revisions. The acronym "INA" signifies that information is not available.

The reader should be attentive to the footnotes at the bottom of pages, particularly those accompanying a data table. The footnotes help the reader to properly interpret the data, and they also indicate when more detailed (by subject or by area) data than that which is shown is available from SRC. A list of sources follows the footnotes.

Key to Units Abbreviations

| | | | | | |
|---|---|---|---|---|---|
| MBF | - | Thousand Board feet | CWT | - | Hundred Weight |
| KWH | - | Kilowatt Hours | ST | - | Short Tons |
| TKWH | - | Thousand Kilowatt Hours | HST | - | Hundreds of Short Tons |
| $ | - | Dollars | TST | - | Thousands of Short Tons |
| H$ | - | Hundreds of Dollars | $/ST | - | Dollars Per Short Tons |
| T$ | - | Thousands of Dollars | HBBL | - | Hundreds of Barrels |
| M$ | - | Millions of Dollars | TBPD | - | Thousands of Barrels Per Day |
| B$ | - | Billions of Dollars | MCF | - | Thousand of Cubic Feet |
| GL | - | Gallons | HMCF | - | Hundreds of MCF Per Day |
| TGL | - | Thousands of Gallons | MMCFD | - | Million Cubic Feet Per Day |

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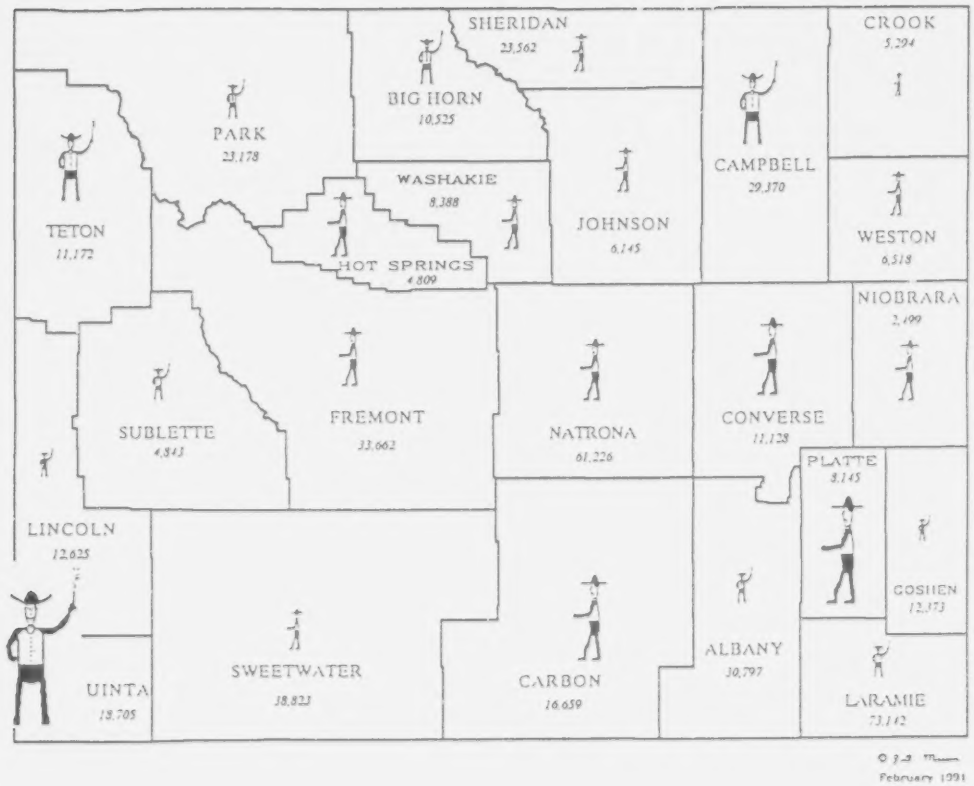
# WYOMING QUARTERLY UPDATE

WINTER 1991

Vol. 10, No.2

UNIVERSITY OF WYOMING




## Wyoming Population

Population Change 1980 - 1990

Symbols Proportional to County Population

*Gains* *Losses*

*1990 State Census 453,588*

SRC
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# DEPARTMENT OF POLITICAL SCIENCE
# UNIVERSITY OF WYOMING

## Wyoming Quarterly Update

Wyoming Quarterly Update (WQU) represents the efforts of the Survey Research Center at the University of Wyoming to provide improved data access services. The data presented in WQU are assembled from secondary sources, such as government agencies and private industry. The staff of SRC greatly appreciates the ongoing, helpful cooperation of each of the data sources.

WQU provides current indicators and timely, easily accessible data. Most of the data published in WQU are updated quarterly with the most current numbers. The complete data sets from which WQU originates are maintained, together with documentation by SRC. Readers are encouraged to contact the Center to find out how to gain access to data which do not appear in the WQU. Many data series, such as gasoline sales and taxation data, span more than 30 years. Numerous other series cover 20 years or more.

The cover of this edition features information from the 1990 Census of Population. Figures for each county represent the change in population from 1980 to 1990.

| County | Pop. change | County | Pop. change | County | Pop. change |
|---|---|---|---|---|---|
| Albany | +1,735 | Hot Springs | -901 | Sheridan | -1,486 |
| Big Horn | -1,371 | Johnson | -555 | Sublette | +295 |
| Campbell | +5,003 | Laramie | +4,493 | Sweetwater | -2,900 |
| Carbon | -5,237 | Lincoln | +488 | Teton | +1,817 |
| Converse | -2,941 | Natrona | +9,370 | Uinta | +5,684 |
| Crook | -14 | Niobrara | -425 | Washakie | -1,108 |
| Fremont | -5,330 | Park | +1,539 | Weston | -588 |
| Goshen | +333 | Platte | -3,830 | Yellowstone | 0 |

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For additional information, contact:

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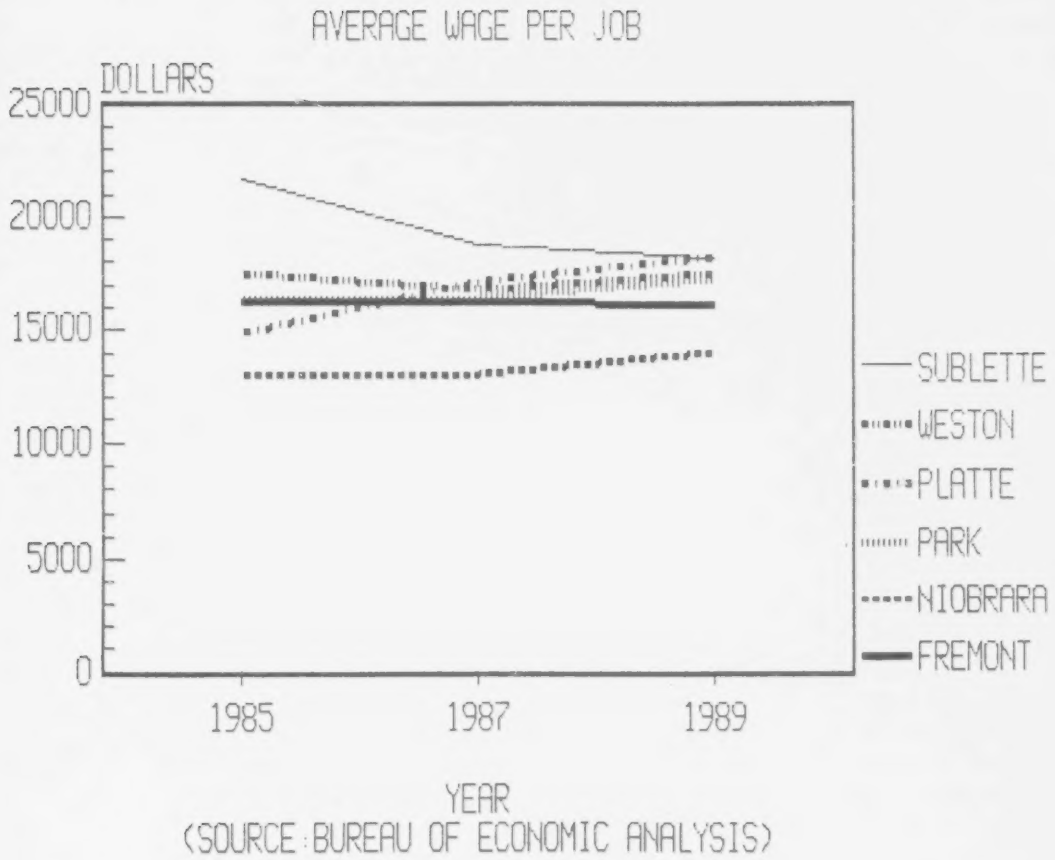


(SOURCE: BUREAU OF ECONOMIC ANALYSIS)

# Overview and Perspectives

The end of 1990 marked the end of a banner year for the Wyoming tourism industry. Overall the State parks in Wyoming boasted a 3.8 percent increase in visitation. Yellowstone National Park had 2.8 million visitors, up from 2.68 million last year. The same trend was seen at Grand Teton National Park where visitation was up 10 percent. Fossil Butte National Monument enjoyed a 33 percent increase in visitation (27,188 visitors in 1990 compared to 20,433 in 1989) and Devils Tower National Monument had the largest annual visitation ever recorded at 433,303. Hosting 67,257 visitors, Ft. Laramie National Historic Site ended the year with a 3 percent increase over 1989.

The Bureau of Economic Analysis (BEA) recently released total personal income figures for the 3rd quarter of 1990. Personal income is defined as the income received from all sources, including private and government wage and salary disbursements, other labor income, farm and nonfarm properties income, rental income, personal dividend income, personal interest income, and transfer payments--less personal contributions for social insurance. Personal income is measured before the deduction of personal income taxes and is reported in current dollars. In the 3rd quarter of 1990 Wyoming's total personal income stood at 7,345 (millions of dollars, seasonally adjusted). This was a 1.5 percent increase from the 2nd quarter of 1990, and compared to a 1.2 percent increase nationally. Wyoming ranked ninth nationwide in percent change in total personal income from 2nd to 3rd quarter 1990. Broken down by industry, mining showed a 4.6 percent increase, service a 1.9 percent increase, construction a .1 percent decrease, and government a .1 percent increase.

The BEA also recently released economic projections through the year 2040. By the year 2040, the BEA estimates Wyoming's per capita personal income (PCPI) at $17,900, and the state population at 477 thousand. Wyoming will continue to be well below the U.S. PCPI and below, to a lesser degree, the PCPI of the Rocky Mountain Region. More information from these projections is presented in the Economic Changes section of this magazine.

Back from the future, Wyoming's unemployment rate for 4th quarter 1990 was 5.4 percent, down from 5.6 percent a year ago. In October, Sublette County had the lowest unemployment rate at 2.3 percent while Johnson County had the highest at 6.7 percent. Statewide, the unemployment rate was 5.0 percent which compared to a national unemployment rate of 5.7 percent.

In November, Albany County claimed top honors with a unemployment rate of 2.6 percent. Lincoln County had the highest unemployment rate at 8.7 percent. Statewide, Wyoming's unemployment rate was 5.7 percent compared to the U.S. rate of 5.9 percent.

Teton County was back on top in December, recording a 3.4 percent unemployment rate. Lincoln County remained the county with the highest unemployment rate at 8.8 percent. Wyoming stayed ahead of the U.S. figures with an unemployment rate of 5.9 percent compared to a 6.1 percent nationally.

There were 596 new corporations reported in Wyoming in the 4th quarter of 1990 (231 foreign charters and 365 domestic charters). This compared to 484 in the 4th

quarter of 1989 and 567 last quarter.

## Preview

Excal, Inc. is moving to Casper. the foundry; which manufactures brass and bronze metal castings, decorative plumbing fixtures, fire hydrants, and marine hardware, expects to be employing some 100 people by 1992.

Pete Lien and Sons Co. is proposing a limestone quarry and processing plant to be built outside of the town of Laramie. Representatives for the company indicate the payroll for the operation will be between $675,000 and $700,000 a year. If given the go-ahead the company is expected to employ about 30 people.

Triton Oil and Gas Corp. is proposing a Divide Coalbed Gas Project designed to develop methane gas trapped in the coal seams of the Red Desert. Figures prepared by the company indicate the project will generate $141.2 million in economic benefits for Wyoming, including $65 million in severance and ad valorem taxes. The project, which would be located northeast of Rock Springs, would employ about 75 workers during construction and up to 10 full-time workers to maintain the site.

## Terry's Trivia

Since the beginning of the Interstate highway construction program in 1956, the Wyoming Highway Department has spent nearly $952 million on Wyoming's Interstates. Of that total, $377 million has been spent on rehabilitation work.

Terry Haven
Editor
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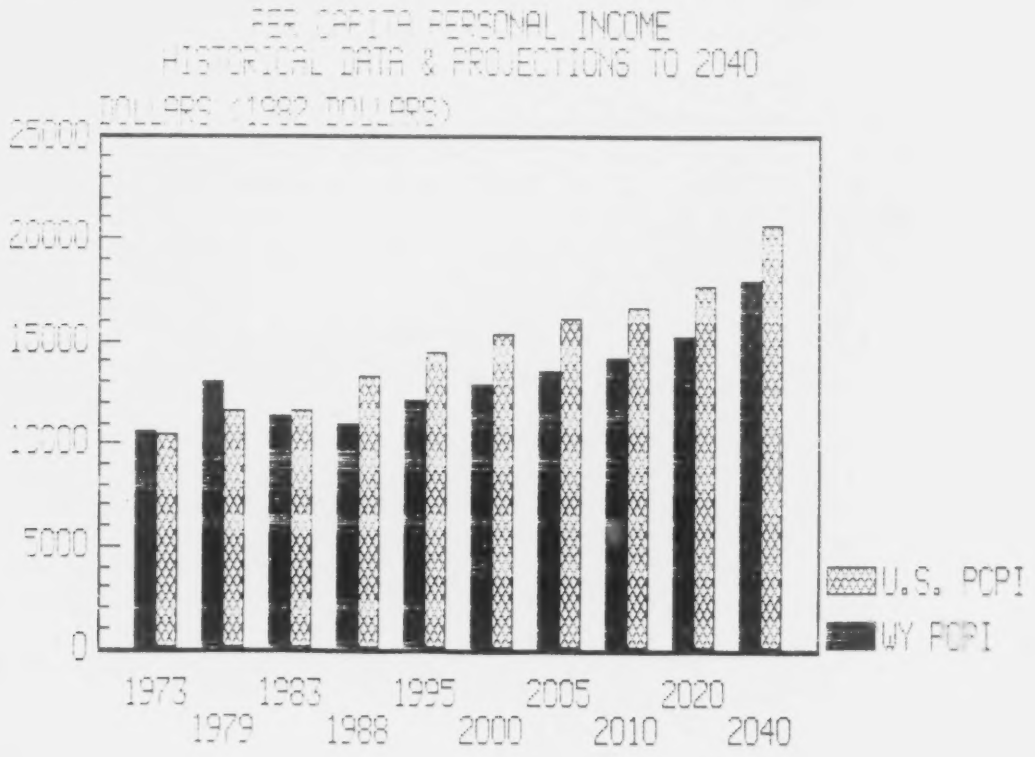

# Winter Minerals Update

In the fourth quarter of 1990 as the world braced for the war which is now a reality, average posted prices for Wyoming crude oil fell from a high of almost $35 in October, to about $32 in November, to just above $25 in December. Even with oil prices declining $10 in the last quarter, prices were markedly better than at least the previous three years where the average monthly posted prices never exceeded $22 and often went below $18 a barrel. Before the war started on January 16th, January oil prices had started to increase, but early indications after war started were confusing at best. Currently, there are just too many "ifs" in this situation for any meaningful comments.

Natural gas prices still look like they bottomed out in 1989-1990 and are poised to increase in 1991. By December, the spot market gas price at Opal, Wyoming, was about the same as the estimated contract price for natural gas in 1990, but this might only be a seasonal aberration (Table 1).

Based only on the average annual rig count, higher oil prices and more stable gas prices apparently have made little difference in the State's oil and gas drilling activities. A closer look at drilling activities, however, suggests that drilling has shifted away from truly exploratory wells to a greater number of infill or development wells for both oil and gas. Notable exceptions are the current horizontal drilling plays (mostly in the Niobrara Formation of southeastern Wyoming) and the coalbed methane plays scattered across the State. The higher oil prices are also having an effect on enhanced oil recovery projects, especially projects slated to use the huff n' puff carbon dioxide process. The **OIL AND GAS UPDATE** below provides more details on these activities in the oil patch.

The big news relative to natural gas involves the proposed gas pipelines to southern California. Kern River Gas Transmission Co. started construction of their pipeline just after the fourth quarter of 1990 while WyCal apparently scrubbed theirs. Governor Sullivan also endorsed a $250 million loan to Kern River, but with certain stipulations. Kern River had not made any decision on the stipulations by mid-January.

Coal production continued strong with spot sales accounting for 16 percent of total coal deliveries at the start of the third quarter of 1990. This continued the trend toward more and more spot or short-term sales. The **COAL UPDATE** in this issue discusses almost 30 new contracts, sales, or test-burns of Wyoming coal, including sales to Spain. Prices paid for spot sales, however, did not increase.

In regard to other minerals, trona production set a new record in 1990 (Table 2) while uranium prices fell in the fourth quarter, putting a damper on some of the guarded optimism of the third quarter. Interest in gold, copper, aggregate, decorative stone, and limestone continued along with some renewed interest in diamonds.

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## OIL AND GAS UPDATE

The uncertainty over what will happen in the Middle East caused considerable fluctuation in crude oil prices during the fourth quarter of 1990. The average posted price for Wyoming sweet crude peaked in October, 1990, at $35 per barrel but dropped in November and December. December's average posted price was just slightly over $25 per barrel. Most of the drops in price were attributed to at least fleeting optimism that the Middle East crisis might be settled peacefully, to Iraq's release of the American hostages, and to the announcement that OPEC and other countries have more than made up the amount of production that was lost when the United Nations placed an embargo on oil production from Iraq and Kuwait.

In 1990, the average prices paid for spot sales of natural gas were mostly higher than for corresponding months in 1989. The demand for natural gas is finally catching up with supply and prices should rise slightly in 1991. Another factor that will help Wyoming gas producers after 1991 is the Kern River pipeline from southwestern Wyoming to southern California.

The Wyoming rig count did not respond to the higher oil prices as the average monthly count during the fourth quarter of 1990 was lower than in 1989. The average yearly count was only slightly higher than 1989 and has essentially been the same for the past five years. There is still too much volatility in prices for companies to invest heavily in ventures where production is several years away.

The speculation on who might build the gas pipeline from southwestern Wyoming to southern California is over. On January 3, 1991, Kern River Gas Transmission Co. began construction of sections five and six of their pipeline. Both of these sections are in southeastern Utah. The Kern River pipeline will consist of eight sections that are from 61 to 112 miles in length. The entire pipeline will be 904 miles long and is scheduled for completion by late 1991 or early 1992. About two weeks before Kern River began construction, WyCal, the other company in the running to build a pipeline from Wyoming to southern California, announced that their line would not be built.

In a related item, Governor Mike Sullivan endorsed a $250 million State loan to build a pipeline to southern California. Governor Sullivan, however, seeks several additional provisions to make the loan acceptable: 1) An acceleration provision that contains a grace period; 2) Provision for an accelerated repayment call by the State Treasurer at the request of the Governor and the Attorney General; 3) Parental guarantee by Williams and Tenneco, joint owners of the Kern River Gas Transmission Company; 4) Provision for payment of breakup fees if the loan is committed, but not accepted; and 5) The establishment of a reasonable time for negotiations of the loan. The loan is expected to lower transportation costs thereby making the gas in Kern River's pipeline more competitive. While the initial capacity of the pipeline is 700 million cubic feet per day, it could be expanded to 1.2 billion cubic feet.

In other pipeline news, the capacity of Northwest Pipeline Corp.'s system will be expanded by 534 million cubic feet of gas per day. The main pipeline begins in northwestern New Mexico and ends at the Canadian border north of Seattle, Washington. The pipeline passes through southwest Wyoming and transmits gas processed at a Northwest gas plant near Opal,

Wyoming.

In other industry news, Coastal Chem Inc. has signed a $72 million contract with Davy McKee Corp. for a methyl butyl ether (MTBE) complex near Cheyenne. The complex is designed to produce 4,000 barrels per day of MTBE. MTBE is used as an additive in gasoline to reduce air pollution.

The recently enacted Budget Act for Fiscal Year 1991 includes an estimated $2.5 billion worth of energy incentive provisions over the next five years. The Budget Act extends the drilling and production tax credits for nonconventional fuels to January 1, 2003, providing a project begins before January 1, 1993. Nonconventional fuels include coalbed methane; oil produced from shale or tar sands; gas produced from geopressured brine, Devonion shale, or biomass; and liquid, gaseous, or solid synthetic fuels produced from coal. The Act also reinstates production from tight gas sands as a qualifying nonconventional fuel.

Another provision of the Budget Act includes a 15 percent credit for qualified enhanced oil recovery costs. The Act also increases the net income limitation on oil and gas percentage depletion from 50 to 100 percent of net income from the property and now allows percentage depletion claims on proven oil and gas properties which are transferred after October 17, 1990. The Act provides that percentage depletion rates will increase by one percent for each whole dollar that the average domestic wellhead price of crude oil, for the preceding year, is less than $20 per barrel. This figure is not adjusted for inflation and the maximum increase is limited to 10 percent. This provision only applies to interests in marginal wells that are held by independent producers or royalty owners. The Act also modifies the definition of marginal production to include oil or gas produced from a stripper well as well as production of heavy oil. In the Act, a stripper well is one which produces an average of 15 or less equivalent barrels of oil per day.

The new law provides oil and gas producers a special deduction from the alternative minimum tax. This deduction cannot exceed 40 percent of the alternative taxable income and cannot be carried forward. The deduction is phased out in taxable years when the price of crude oil exceeds $28 per barrel and is eliminated if the average price of oil exceeds $34 per barrel.

The Budget Act should help slow the abandonment of stripper wells within the United States and Wyoming. According to the annual stripper well survey conducted by the Interstate Oil Compact Commission, 16,107 stripper wells were abandoned in the U. S. in 1989. Two hundred sixty-three of these were abandoned in Wyoming. Wyoming still has 2,982 stripper wells which produce an average of 4.95 barrels of oil per day. For comparison, the United States has 452,589 stripper wells which produce an average of 2.34 barrels of oil per day.

Provisions of the Budget Act should also help stimulate exploration and production of coalbed methane and gas from formations designated as tight gas sands in various areas of the State (see section on Coalbed Methane below). Since enhanced oil recovery projects will also benefit from the Budget Act, the use of the carbon dioxide huff n' puff process may increase in Wyoming. The University of Wyoming's Enhanced Oil Recovery Institute has begun a multi-well test series of the huff n' puff process funded by a legislative appropriation of $500,000. Wells have already been treated in Crooks Gap, Lost

Soldier, Wertz, Salt Creek, Beaver Creek, and Little Buffalo Basin Fields.

Amoco already had plans to use the huff n' puff process on as many as 4,000 wells in Elk Basin, Little Buffalo Basin, Winkleman, Lander, Beaver Creek, Lost Soldier, Wertz, and Salt Creek Fields. In a December docket before the Wyoming Oil and Gas Conservation Commission, Conoco announced plans to use the huff n' puff procedure on a total of six wells in Bonanza, Gebo, Glenrock South, Sunshine North, and Sussex West Fields.

The Budget Act also reduces Wyoming's share of Federal mineral royalties. The deductions are to help pay for the Minerals Management Service's costs for administering the Federal royalty management program. In FY91-92, these administrative costs are estimated at $6.4 million and $7.7 million, respectively.

Lease sales in the State continue to do well. The U. S. Bureau of Land Management's (BLM) October sale had a high per-acre bid of $200 made by Gerrity Oil and Gas for a 40-acre tract covering NE NE section 10, T15N, R65W. The lease is on the southwestern flank of Silo Field and is less than a mile west of Cowan Oil's 1 Warren well, the first horizontally-drilled Niobrara well in the State (see section on Horizontal Drilling below). The 1 Warren well produced over 11,000 barrels of oil in June and July, 1990, before it was shut in due to mechanical problems.

The highest overall bid at this sale ($206,800) was made by Tom Brown Inc. for a 1,880-acre in portions of sections 24, 29, 30, 31, 32, 33, and 34, T37N, R91W. The lease is between four and seven miles southwest of Lance gas production at Kanson Draw Field and is about six miles northeast of Fort Union oil and gas production at Fuller Reservoir Field.

The high per-acre bid at the December BLM sale was $260 made by Wells Petroleum for 161.9-acre lease covering parts of sections 12 and 21, T48N, R70W. The portion of the lease in section 12 is less than a mile from Minnelusa oil production at Fish Field and the portion of the lease in section 21 is less than a mile from Minnelusa oil production at Railroad Bend Field.

The highest overall bid at the December sale ($117,900) was made by Maurice Brown for a 1,178.93-acre parcel in portions of sections 10, 22, 27, 28, 29, 32, and 33, T54N, R68W. The lease is near Minnelusa oil production at Lilly Field and near Muddy oil production at VI Bar Ranch Field.

The State Land and Farm Loan Office's November sale also did well. The high per-acre bid of $265 was made by James Clark Oil Properties for a 40-acre tract that covers SE NW section 8, T40N, R76W. The parcel is two miles east of GLG Inc.'s Federal exploratory unit established for horizontal drilling of the Niobrara Formation. Frontier and Shannon production at Finley Draw Field is about two miles east of this parcel.

The highest overall bid ($86,400) at the November sale was made by W.C.S. Oil and Gas for a 640-acre parcel that covers section 36, T17N, R64W. The lease is about four miles northeast of a horizontally-drilled Niobrara well at Silo Field.

Based on company data and on information compiled and published by Petroleum Information, the following significant exploration and development

events occurred in Wyoming during the fourth quarter of 1990.

A. Chevron USA completed its 112 Birch Creek Unit well in SW SE section 26, T27N, R113W, in the Frontier Formation. The well flowed 8.3 million cubic feet of gas, 68 barrels of condensate, and 60 barrels of water per day. Chevron also completed the 116 Birch Creek Unit well in NW SW section 22, T27N, R113W, in the Frontier for an initial flowing potential of 4.4 million cubic feet of gas, 19 barrels of condensate, and 19 barrels of water per day.

B. Exxon Corp. began drilling an 18,000-foot Madison test on the southwestern flank of the northeast-trending Canyon Creek anticline. The 34 Canyon Creek Dome Unit well is being drilled in NW NE section 9, T12N, R101W. Celsius Energy and Exxon recently signed an agreement to jointly explore this area.

C. Union Pacific Resources completed a wildcat discovery on the north side of the Washakie Basin. The 1 UPRR 4-27 well in C SW section 27, T20N, R97W, flowed 10.2 million cubic feet of gas daily on a test of the Ericson Sandstone.

D. Celsius Energy completed a wildcat discovery in the Almond Formation for an initial potential of 246,000 cubic feet of gas and 282 barrels of water per day. The 1 Anthill Unit was drilled in NW NW section 8, T12N, R93W.

E. TCF Inc. tested another well in Fuller Reservoir Field in several zones in the Fort Union Formation. The 4 Esther Fuller well in NE SE section 26, T36N, R94W, flowed 10.0 million cubic feet of gas per day.

F. The 1 Moneta Hills Unit well in NW NE section 11, T37N, R91W, drilled by Wagner & Brown, encountered eight productive zones in the Fort Union Formation. Only one of these zones was tested and it flowed 1.2 million cubic feet of gas, 25 barrels of condensate, and two barrels of water per day.

G. General Atlantic Resources has an apparent gas discovery in the Fort Union at their 35-1 Merlot well in N/2 NW section 35, T37N, R89W. General Atlantic set production casing at the prospect.

H. W. A. Moncrief, Jr. began drilling a 24,500-foot Madison test in October, 1990. The 1 Badwater Creek well is expected to take over a year to drill and is in SW NE section 12, T38N, R89W. Cost of a dry hole is about $17 million and a producer will be an additional $4-5 million. It is hoped the well will extend the productive Madison interval found in two other deep tests on Madden anticline.

I. Fancher Oil completed a new Minnelusa well in Texas Trail Field, the 14-10 Zimmerschied-Hahn, in NW SE section 14, T53N, R68W. The well was completed pumping 364 barrels of oil per day.

J. Western Interior Resources drilled the second producing well in Trava Field. The 3 Trava-State well in SW SW section 16, T52N, R67W pumped 25 barrels of oil per day and no water from the Minnelusa Formation.

K. Presidio Exploration completed two new Minnelusa oil producers in Heath Field. The 2-5 Miramar-Federal in NE SE section 5, T52N, R68W, pumped 438 barrels of oil per day. The 44-5 Miramar-Federal in SE SE section 5, T52N, R68W, pumped 407 barrels of oil per day. Slawson Exploration

also completed a new Minnelusa well in Heath Field. The 2-4 Miramar-Federal pumped 508 barrels of oil per day.

L. Double Shield Field has a new Minnelusa producer. Yates Petroleum completed the 1 Elvira well in NW NE section 22, T51N, R70W, pumping 103 barrels of oil and eight barrels of water per day.

M. Apache Corp. completed a new Minnelusa oil producer in Lone Cedar Field. The 8 Lone Cedar Unit well in NW SE section 8, T51N, R69W, pumped 480 barrels of oil per day.

N. Phillips Petroleum completed a wildcat nearly a mile north of the inactive Garner Lake Field. The 1 Garner Lake well in SW SE section 21, T51N, R69W, pumped 410 barrels of oil per day from the Minnelusa Formation.

O. A new field, designated Springen North, was discovered by CNG Producing's 23-30 Federal well in SE NW section 20, T51N, R71W. The well pumped 158 barrels of oil daily from the Muddy Sandstone.

P. Caza Exploration discovered oil in the Minnelusa at their 2 Tigers Tail well in SW NE section 23, T50N, R71W. The well produced an average of 140 barrels of oil and 250 barrels of water per day during eight days in August.

Q. Robert E. Hudson added a Minnelusa oil producer to Rozet Field. The 41-28 Miller well in NE NE section 28, T50N, R69W, was completed pumping 180 barrels of oil per day.

R. Raymond T. Duncan Inc. has an apparent Minnelusa discovery at their 33-13 Record well in NW SE section 13, T50N, R71W. A drillstem test recovered 1,580 feet of gas and 5,193 feet of gas-cut oil.

S. Nicor Exploration and Production discovered oil in the Minnelusa at their 13-34 Mallard-Federal well in NW SW section 34, T49N, R72W. This well was completed for 295 barrels of oil per day. The well is about one-half mile southwest of Minnelusa production at McCreery Field.

T. During 24 days in August, Caza Exploration produced an average of 16 barrels of oil and 65 barrels of water per day from the Minnelusa at their 1 Ripcord-State well in SW NW section 16, T47N, R70W.

U. Raymond T. Duncan Inc. and Apache Corp. completed a new Minnelusa producer less than a mile from Minnelusa production at Maysdorf and Haight Fields. The 1 L. A. Sims well in NE SE section 30, T47N, R71W, was completed for an initial pumping potential of 435 barrels of oil per day.

V. Santa Fe Energy Operating Partners L. P. staked the first location of a proposed 26-well Minnelusa joint exploration program with Celsius Energy Co. The 1-7 Fire-Federal well will be drilled in SE NE section 7, T46N, R72W, about three miles south of Minnelusa production at Hawk Point Field.

W. Nicor Exploration and Production completed a Minnelusa well for 334 barrels of oil per day. The 41-1 Dawn-Federal well in NE NE section 1, T46N, R71W, is within a mile of Minnelusa, Dakota, and Muddy production at Am-Kirk Field.

X. Kerr-McGee Corp. completed a new Dakota producer in Buck Draw North Field. The 14-6 NBDU in SE SW section 6,

T41N, R73W flowed 1,481 barrels of oil and 3.0 million cubic feet of gas per day. The operator of Buck Draw North Field currently injects hydrocarbon gas into the Dakota to maintain pressure and enhance production. During September, 1990, the last month for which production figures are available, the field averaged a total of 9,093 barrels of oil and 2.7 million cubic feet of gas per day from only 12 producing wells.

Y. In nearby Powell Field, Woods Petroleum completed a new Frontier producer. The 27-2 Powell Unit well in SW SW section 27, T40N, R74W, pumped 787 barrels of oil and 2.2 million cubic feet of gas per day.

## Horizontal Drilling

During the fourth quarter of 1990, the following significant activities related to horizontal drilling occurred. The discussions are based on company data and on information compiled and published by Petroleum Information.

A. Horizontal drilling activity in and around Silo Field is accelerating since Cowan Oil drilled the first horizontal Niobrara well earlier in 1990. The 1 Warren well in NW NE section 11, T15N, R65W, produced over 11,000 barrels of oil in June and July before it was shut in. Since Cowan's discovery, three additional Niobrara wells were completed and tested. Union Pacific Resources' 1H Antelope 9-11 well in NW SE section 11, T15N, R64W, was completed for an initial pumping potential of 400 barrels of oil and 300,000 cubic feet of gas per day after an earlier 21-hour flow test yielded 1,462 barrels of oil. Their 1 McGahan 21-5H well in NE NW section 5, T15N, R64W, flow-tested 767 barrels of oil and 326,000 cubic feet of gas during a 24-hour period. At the 2-H Willett well in E/2 SE section 22, T16N, R64W, Snyder Oil completed a Niobrara producer for an initial pumping potential of 216 barrels of oil per day. This well had approximately 3,700 feet of horizontal displacement in the Niobrara. Union Pacific Resources has reached total depth at their 1H Goertz 5-12 well in NE NW section 12, T15N, R65W, but no test results are available yet. Snyder Oil started work on the location for their 10-21H Hutton well in SW NW section 21, T16N, R65W, and should begin drilling soon. Additionally, Cowan Oil has locations staked for a well in SW SE section 29, T16N, R64W, a well in E/2 NE section 22, T16N, R64W, and a well in W/2 SW section 21, T16N, R64W. Union Pacific Resources had locations staked for a well in SW SW section 11, T15N, R64W, a well in SW SW section 3, T15N, R64W, and a well in SW SW section 7, T15N, R63W. Union Pacific Resources plans to drill up to 10 wells in the Silo area in 1991. Exxon also plans to drill at least one well. Gerrity Oil and Gas staked a location for a well in NE NE section 10, T15N, R64W.

B. Amoco Production Co. staked a location for a horizontal test of the Frontier at their 1-25 Morton Ranch well in NE SW section 25, T33N, R72W. Amoco plans to drill a vertical pilot hole to 11,400 feet, run logs, plug back to 10,300 feet, and kick off an $8^{o}$/100 feet curved bore hole. Amoco will evaluate Niobrara in the curved part of the hole and Frontier in the horizontal part of the hole. The well will be just over a mile south of Sorpha Field which produces from the Frontier.

C. Harvey E. Yates Co. is drilling its 1H-19-22 Stuart Ranch Deep Unit well in SW NW section 19, T44N, R71W, to horizontally test the Niobrara. The well is a reentry of a dry hole complete in 1988 by Chevron USA

and is less than a mile east of a shut-in Niobrara well that produced over 32,000 barrels of oil. The company also staked a location for another horizontal Niobrara test with a surface location in NE SW section 19, T44N, R71W.

D. GLG Energy reached total depth at their horizontal Niobrara test, the 32-6H Si Tanka well in SW NE section 6, T38N, R77W. GLG also staked a location for a second horizontal Niobrara test in SE SE section 36, T39N, R78W. GLG will drill at least four horizontal wells on the Si Tanka Federal exploratory Unit that was approved in 1990.

E. Texaco Inc. completed an Almy (Fort Union) oil producer that pumped 37 barrels of oil and three barrels of water per day. The G634Y La Barge Unit well in NE SW section 34, T27N, R113W, was drilled vertically to 520 feet and was plugged back to 492 feet. From a vertical depth of 440 feet, horizontal legs were drilled to the north, the southeast, and the southwest. Most Almy wells in the area produce less than 5 barrels of oil per day.

**Coalbed Methane**

There are two areas of shallow Fort Union gas production in the north-central Powder River Basin where 15 different companies are active. The exploration in these two areas in concentrated on shallow sandstone units in the Fort Union Formation. The source for the gas produced from these sandstones is most likely the thick Fort Union Formation coals in the area; however, the gas is not "coalbed methane" because the wells are not completed in coal beds. Only a few wells within these areas are producing gas from coal beds. Betop's wells are some that are producing coalbed methane.

The most active area of coalbed methane exploration in the fourth quarter was in the southern part of the State. Fuel Resources drilled four new wells in sections 1, 2, and 12, T12N, R90W. No information is yet available on these wells. Fuel Resources drilled five wells earlier this year and has locations staked for 36 other coalbed methane wells in the area. The objective in all the wells is the Upper Cretaceous Almond Formation at depths between 500 and 3,000 feet.

Saxon Exploration drilled two coalbed methane tests of Mesaverde coals in the fourth quarter. The wells were drilled in section 7, T25N, R102W, and in section 23, T25N, R103W. No other details are yet available on these wells. Saxon plans to drill an additional 50 to 100 wells in the area.

In an adjacent area, Triton Oil and Gas Corp.'s plans are still on hold. Triton wants to drill 93 coalbed methane wells in the Mesaverde coals and construct a gas processing plant with a capacity of 71 million cubic feet per day. Triton's plans are waiting on decisions by the U. S. Bureau of Land Management.

Gilmore Oil and Gas set production casing at their 1 Artesian Unit well in SE NE section 1, T49N, R77W. The well was drilled to test the coalbed methane potential of coal beds in the Fort Union Formation. Gilmore has also begun work on another well location in the same section. This activity is about 10 miles north of Coastal Oil and Gas' apparently unsuccessful coalbed methane exploration program (in the Fort Union) at their Sasquatch Unit.

Texaco Inc. drilled their 1 Texaco-Lott-Fee well in SE SE section 13, T52N, R83W, to test the coalbed methane potential

of coal beds in the Wasatch Formation. No further details on this well are yet available. Texaco staked a location for a second well in the same section.

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Geological Survey of Wyoming

## COAL UPDATE

1990 coal production from Wyoming will almost certainly set another record. Although final production figures will not be available until at least mid-February, 1991, coal deliveries through September, 1990, were 8.4 million tons more than for the same period in 1989. In fact, if coal deliveries for the last three months of 1990 were only equal to those for the same period in 1989 and if unreported tonnage for 1990 equals that of 1989, our projected production of 179.2 million tons would be exceeded by 0.3 million tons.

It is also notable that coal deliveries to electric utility companies in August exceeded 16 million tons, the highest amount of coal ever recorded as delivered in a single month. Delivered tonnages in July, August, and September of 1990 were also among the highest monthly totals recorded.

The amount and percentage of spot coal delivered to electric utility companies also increased during the third quarter of 1990 (the last quarter for which we have data). For example, in August, spot coal deliveries accounted for almost 14 percent of the total coal delivered and in September it accounted for nearly 16 percent of total coal deliveries. This trend supports our contention that the percentage of low-priced coal continues to increase. The large number of coal purchasing transactions reported in the Powder River Coal Field during the last quarter of 1990 (see Coal Contracts-Powder River Coal Field below), along with published coal prices, indicates the influence of the spot market on Wyoming coal production and prices.

Significant increases in deliveries to Georgia, Indiana, Iowa, Michigan, Nebraska, and Illinois power plants more than offset slight decreases in deliveries to Arkansas, Louisiana, and Texas power plants. There appears to be a slight eastward shift in Wyoming spot coal markets as some utility companies whose plants do not have scrubbers and (or) whose plants use high-sulfur eastern coals attempt to deal with amendments to the Clean Air Act, which further restrict sulfur dioxide emissions. Many utility companies are now assessing the economics of: 1) burning low-Btu, low-sulfur coal, 2) installing and using scrubbers, 3) burning natural gas, or 4) purchasing power elsewhere.

Transportation of coal will play an important role in developing more distant markets for Wyoming coal. According to some transportation analysts, there is only about 30 million tons of uncommitted rail capacity out of the Powder River Coal Field. If this is true, by as early as 1994 this additional rail capacity could be consumed in just the Wyoming portion of the coal field. If Montana coal production increases, the uncommitted rail capacity will be gone even before 1994.

Although there are no announced plans for increasing rail capacity out of Wyoming, one suggested solution is "double tracking" the existing grail lines. Some industry analysts fear that increased

transportation costs of coal (brought about by the financing of construction costs or even through increased fuel costs caused by rising oil prices) may offset the economic advantages that currently make low-sulfur coal from Wyoming so attractive to utility companies.

By the same reasoning as above, any significant increases in the delivered price of Wyoming coal (or other low-sulfur western coal) could also create barriers and limits to the growth potential of western coal. There are also some coal industry analysts who believe that the demand for low-sulfur western coal will be short-lived because technological advances (supported in-part by programs such as the Clean Coal Technology Program), conservation, and alternative energy sources will soon reduce the need for low-sulfur western coals. This view, however, seems very improbable given the long lead times needed to phase in new technologies or alternative energy sources.

The Clean Air Act Amendments of 1990 were signed into law by President Bush on November 14, 1990. Congress has been debating various aspects of the legislation for the last 13 years. The 10-pound, 700-page bill addresses many issues and programs outside the coal industry (such as auto emissions, nitrous oxide emissions from all sources, industrial boiler emissions, and numerous related subjects), but the acid rain control measures addressed in Title V of the bill are those that affect the coal industry the most. The sulfur dioxide ($SO_2$) reduction program addressed in the bill consists of two phases. Phase I requires the 111 highest $SO_2$ -emitting power plants in some 22 states to reduce their total annual emissions to 2.51 pounds of $SO_2$ per million Btu (multiplied by baseline fuel consumption) starting on January 1, 1995. Phase II requires all $SO_2$-emitting utility units with nameplate generating capacity equal to or greater than 75 megawatts to reduce total annual emissions to no more than 1.2 pounds of $SO_2$ per million Btu (multiplied by baseline fuel consumption) beginning on January 1, 2000. Phase II also limits total annual $SO_2$ emissions from all U.S. power plants to 8.9 million tons of $SO_2$ by the year 2000.

Another provision of the new act includes a system of marketable allowances that enables tonnages of emitted $SO_2$ to be "traded". Utility companies that reduce $SO_2$ emissions below the required level can accumulate tradable, saleable pollution "credits". A company unable to make on-site reductions in $SO_2$ emissions can purchase pollution "credits" and apply these tonnages of $SO_2$ towards the limits of $SO_2$ emissions required by law. Beginning in the year 2000, no new plant could go on line until it had obtained the necessary pollution credits to cover the entire amount of its expected annual $SO_2$ emissions.

Developments in western and southwestern Wyoming

Operator of the Intermountain Power Project (IPP) in western Utah announced in November that the 1,600-megawatt plant would begin testing bituminous coal from underground mines in western Colorado and southern Wyoming. The $5 billion Intermountain power plant uses 4 to 5 million tons of coal a year from Utah's underground coal mines and supplies about one-third of the electricity for Los Angeles, California. Twenty percent of the plant's coal needs are met from spot coal purchases and the plant is capable of burning bituminous coal with a heating value greater than 10,500 Btu/pound. Although no specific Wyoming coal mines have been mentioned as possible sources for

the coal, Arch Mineral Corporation's newly-opened Pilot Butte underground mine north of Rock Springs is a likely candidate. The Governor of the State of Utah has threatened legal action against IPP if coals other than those from Utah are burned in the plant.

Arch Mineral Corporation's Pilot Butte underground mine is supplying coal to the Jim Bridger power plant. About 75 percent (300,000 tons) of the 400,000 tons that Arch expected to produce from the mine in 1990 were sold to Pacific Power and Light Company's Jim Bridger power plant. The full productive capacity of the mine is about 750,000 tons per year and the mine contains about 63 million tons of reserves.

Developments in the Hanna Coal Field

Fourth quarter coal purchases from coal producers in this field are worth noting. Cyprus-Shoshone Coal Company furnished 9,000 tons of coal for testing in Nebraska Public Power District's (NPPD's) Sheldon, Nebraska, power plant. The coal was used in late November and early December and followed a successful earlier test burn of 200 tons. NPPD is blending this coal from the Shoshone No. 1 underground mine near Hanna with contract coal from the Black Thunder surface mine in Campbell County.

Arch of Wyoming and Cyprus-Shoshone Coal Company each furnished 18,000 tons of coal for test burns at Missouri Public Service Company's (MPS) Sibley, Missouri, power plant. The coal was from the Medicine Bow and the Shoshone No. 1 mines. By mid-1992, MPS expects to switch from Illinois Basin coal to western coal; the test burns from the Hanna Coal Field are part of MPS's western coal evaluation program.

As reported in April of this year, Pacific Power and Light Company (PP&L) announced the purchase of three 100,000-ton increments of coal from Arch of Wyoming's Medicine Bow mine for testing at the Jim Bridger power plant east of Rock Springs. The test burns, which were originally scheduled for the third and fourth quarters of 1990, have been delayed until 1991.

Several publically-owned utility companies recently released F.O.B. mine prices from several coal contract solicitations. Among the bids received were three from producers in the Hanna Coal Field. For a coal supply contract of 580,000 tons with San Antonio City Public Service Board's J. T. Deely, Texas, plant (see item 21 below under Coal Contracts-Powder River Coal Field), Arch of Wyoming submitted a bid of $14.25 per ton for 10,000 Btu/pound coal from the Medicine Bow mine. This equates to 71.25 cents per million Btu, as compared to the winning bid of 21.76 cents per million Btu which was made by Amax Coal Company's Belle Ayr mine in the Powder River Coal Field. For a contract solicitation by Fremont (Nebraska) Department of Utilities, Arch of Wyoming submitted a bid for $14.00 per ton (67.31 cents per million Btu) for 10,400 Btu/pound coal from the Medicine Bow mine. Cyprus-Shoshone Coal Company submitted a bid of $17.50 per ton (77.43 cents per million Btu) for 11,300 Btu/pound coal from the Shoshone No. 1 underground mine. The winning bid for this contract was $4.05 per ton (23.55 cents per million Btu) for 8,600 Btu/pound coal from a producer in the Powder River Coal Field.

Developments in the Powder River Coal Field

There has been some progress toward the construction of $65 million, commercial-size, K-Fuels plant. K-Fuels Partnership and

Enserv, a subsidiary of Wisconsin Power and Light company (WPL), reached an agreement in December in which Enserv will acquire majority interest in EA-K Energy. K-Fuels Partnership had been the major owner of EA-K Energy, a company holding the rights to license the K-Fuels technology in North America. Before the agreement, K-Fuels Partnership and its subsidiary, Energy Brothers, were delinquent on an $800,000 loan payment due the State of Wyoming for an $11.7 million clean coal technology loan given to Energy Brothers for construction of a K-Fuels demonstration plant near Gillette. The agreement with Enserv enables Energy Brothers to pay off the overdue loan payment and to proceed with planned construction of the commercial-sized plant in the spring of 1991.

WPL will purchase up to one million tons of the high-Btu, low-sulfur K-Fuels pellets, 400,000 tons of which are to be delivered to WPL by January 1, 1993. When completed, the K-Fuels plant will produce about 530,000 tons of finished fuel pellets from coal mined at the adjacent Fort Union coal mine. Apparently three other utility companies are involved in the financing and ownership of the new plant, but an investment firm owned by Iowa-Illinois Electric Company was the only company identified by name. The commercial plant should benefit from the recently enacted extension to the Federal Alternative Fuels Tax Credit Program. A tax credit of $20 per ton is expected.

A new long-term coal transportation contract was recently signed by Savage Industries, Inc. of Salt Lake City, Utah, and Black Hills Power and Light Company (BHPL). Savage will haul coal by truck from Wyodak Resources Development Corporation's Wyodak mine (east of Gillette) to BHPL's Osage plant at Osage, Wyoming, and to the Kirk plant near Lead, South Dakota. The length of the contract and the tonnages of coal involved were not disclosed.

The Tennessee Valley Authority (TVA) has recently purchased spot coal from five coal producers in the Powder River Coal Field. The coal is for TVA's Paradise, Kentucky, plant (see item 23 below). TVA has been given until July 1, 1991, to find a solution to the opacity emission problems at both Units 1 and 2 (which have scrubbers) and at Unit 3 (which lacks a scrubber). TVA announced that if they can't solve the problems at Para[illegible]ithout having to burn western coal, they may be forced to fire all three units with up to 9 million tons of coal per year from the Powder River Coal Field.

In September, 1990, the Wyoming Environmental Quality Council approved new air quality rules that exempt coal mines in the Powder River Coal Field from some of the air quality regulations that apply to other areas of the State. The U. S. Environmental Protection Agency (EPA), whose rules and regulations at coal mines are enforced by the State of Wyoming, approved the new rules. It was ruled that standards developed for prevention of significant deterioration were based on a Federal pollution model that was incorrectly applied to the mines in the Powder River Coal Field. Fugitive dust emissions, which are the major pollutants from the mines, threatened to curtail coal production in this part of the State.

Coal Contracts- Powder River Coal Field

Purchasing activities in this coal field were numerous during the last quarter of 1990 as many utility companies finalized their coal purchases for the year and announced future purchases for the start of 1991. Along

with the numerous spot sales, several longer-term contracts were also announced. Purchase of coal for conducting test burns and blending with other coals was down somewhat from previous quarters.

New coal contracts/sales are summarized below:

1) Sun Coal Company's subsidiary, Cordero Mining Company is supplying 150,000 tons of spot coal to Grand Island Electric Department's Platte, Nebraska, power plant. Coal deliveries from the Cordero mine began in November, 1990 and will continue through February, 1991.

2) Amax Coal Company, Mobile Coal Producing, Inc. and Carter Mining Company are supplying a total of 1.35 million tons of coal to Portland General Electric Company's (PGE) Boardman, Oregon, plant. About 550,000 tons were delivered during the last quarter of 1990 and the remaining 800,000 tons will be delivered through June, 1991. Although neither the mine names nor the specific tonnages from each company were released, the coal purchase is part of a renegotiated contract PGE recently signed with Amax Coal Company. This contract allows PGE to substitute coal purchased from Amax Coal Company in the event that Amax is unable to meet a competitor's bid price.

3) Mobile Coal Producing, Inc.'s Caballo Rojo mine provided 100,000 tons of spot coal for Northern Indiana Public Service Company's (NIPSCO's) Dean H. Mitchell, Indiana, power plant during November and December. The coal is supplied through an "as-needed, as available" purchase agreement.

4) Amax Coal Company's Belle Ayr mine also supplied 120,000 tons of spot coal to NIPSCO's Mitchell, Indiana, plant during November and December under a similar "as-needed, as available" purchase agreement.

5) Thunder Basin Coal Company (a subsidiary of Arco Coal Company) will supply Southwestern Public Service Company's (SWPCS's) Ray Tolk, Texas, power station with 300,000 to 500,000 tons of coal during 1991. The coal, which will originate on the Burlington Northern Railroad (BN) at either the Coal Creek or the Black Thunder mine, will continue from Denver via the Atchison, Topeka, and Santa Fe Railway Company.

6) Thunder Basin Coal Company and Rochelle Coal Company ( a subsidiary of Peabody Development Company) will each supply half of the 800,000 to 1.2 million tons of coal needed in 1991 by SWPSC's Harrington, Texas, power station. The coal, which will originate at either the Coal Creek or the Black Thunder mines and at the Rochelle mine, respectively, will be transported by BN.

7) Cordero Mining Company's Cordero mine, Thunder Basin Coal Company's Black Thunder mine, and Rochelle Coal Company's Rochelle mine will collectively supply 500,000 to 1 million tons of coal per year for two years to Detroit Edison's River Rouge or St. Clair, Michigan, power plants. The contracts provide for the purchase of an additional 1 million tons of coal per year if needed. The contracts also provide for possible extensions of deliveries for another 10 years. Neither the specific amounts of coal from each mine nor the transportation details were announced.

8) Mobile Coal Producing, Inc. and West Texas Utilities (WTU) signed a coal supply contract in late October, 1990, but no terms were announced. Carter Mining Company currently supplies WTU's Oklaunion, Texas, power plant under a long-

term contract that will expire in July, 2006. Coal under the new contract would be from Mobile's Caballo Rojo mine and presumably would supplement coal that Carter Mining Company sells to the Oklaunion plant.

9) Mobile Coal Producing, Inc. and Grand River Dam Authority (GRDA) recently renegotiated the price on a coal supply contract for the Grand River Dam power station at Chouteau, Oklahoma. The F.O.B mine price of the coal was reportedly reduced form $6.70 per ton to slightly more than $4.00 per ton; at the same time, the heating value guarantee was also raised.

10) Carter Mining Company (a subsidiary of Exxon Coal USA, Inc.) will furnish Iowa Public Service Company's (IPS's) George Neal Unit No. 3 near Sioux City, Iowa, with 850,000 tons of coal per year for four years, starting in January of this year. The coal from Carter Mining's Caballo mine will be transported by Western Rail Properties, Inc. (WRPI), Union Pacific Railroad Company (UP), and Chicago and North Western Transportation Company (C&NW). The coal contract also contains an option for an additional two years of deliveries.

11) Cordero Mining Company's Cordero mine will also supply IPS's George Neal Unit No. 3 with up to 1 million tons of spot coal in 1991. The Cordero mine supplied spot coal to this same unit as well as Unit No. 4 in 1990.

12) Rochelle Coal Company furnished 75,000 tons of coal from its Rochelle mine in southern Campbell County to Archer-Daniels-Midland Campany's Lincoln, Nebraska, manufacturing plant. This coal was delivered in the fourth quarter of 1990.

13) Cordero Mining Company will furnish 1 million tons of coal to Wisconsin Power and Light Company's (WPL's) Columbia No. 2 unit near Portage, Wisconsin, in the first part of 1991. The coal will be mined at the Cordero mine and transported to Wisconsin by WRPI, C&NW, and UP rail lines.

14) Carter Mining Company will also supply 200,000 tons of spot coal from the Caballo mine to WPL's Columbia No. 2 unit during the first part of 1991.

15) Triton Coal Company (a division of Shell Mining Company) will furnish up to 500,000 tons of spot coal to Basin Electric Power Cooperative's Laramie River power station north of Wheatland, Wyoming. The coal, which will be mined at the Buckskin mine north of Gillette, will be delivered in 1991. Triton's Buckskin mine currently supplies 220,000 tons of coal a year to the Laramie River plant under a term contract.

16) Amax Coal Company's recent contract with Omaha Public Power District (OPPD) to supply 250,000 tons of blended coal (15 percent dried product and 85 percent run-of-mine) was recently modified. The blended coal was to be burned at OPPD's North Omaha and Nebraska City, Nebraska, power plants. OPPD will still purchase 250,000 tons of coal from the Belle Ayr mine, but it will be run-of-mine coal instead of the blended product.

17) Amax Coal Company will supply 700,000 tons of coal from either the Belle Ayr or Eagle Butte mine to OPPD's North Omaha, Nebraska, power plant. The coal will be delivered during the last three quarters of 1991; an additional 100,000 tons of coal will be optional. The coal will originate on BN with final delivery by UP. The reported

F.O.B. mine price of the coal was less than $4.00 per ton.

18) Triton Coal Company's Buckskin mine will supply 500,000 tons of spot coal to OPPD's North Omaha, Nebraska, power plant during the first four months of 1991.

19) Cordero Mining Company and Lower Colorado River Authority (LCRA) have signed a one-year contract for 200,000 tons of spot coal. The Cordero mine will supply this coal to the Fayette Power Project Unit No.3 in 1991 to augment long-term contract coal also supplied by Cordero. The Fayette Power Project No. 3 is also fueled by Texas lignite, which is mined near the plant.

20) Carter Mining Company will supply LCRA's Fayette Power Units 1 and 2 with 195,000 tons of spot coal from the Caballo mine in 1991. The published F.O.B. mine price was $3.95 per ton for coal with a heating value of 8,540 Btu/pound; delivered price to the Texas utility was $20.80 or 121.8 per million Btu. Using these figures, transportation charges for the coal are $16.85 per ton, or about 81% of the delivered price. Of the six bids considered for this contract solicitation, the highest priced coal was $5.15 per ton for coal with a heating value of 8,775 Btu/pound. The average F.O.B. mine price for the bids was $4.29 per ton and average delivered price was $20.98 per ton.

21) Amax Coal Company recently signed an agreement with San Antonio City Public Service Board to supply 580,000 tons of spot coal from the Belle Ayr mine to the J.T. Deely power plant at San Antonio, Texas. The coal will be delivered in 1991 via Union Pacific Railroad. The published F.O.B. mine price for the coal was $3.70 per ton. The average F.O.B mine price for nine bids from mines in the Powder River Coal Field was $4.26 per ton and transportation charges accounted for over 80 percent of the delivered price.

22) Some 23,000 tons of spot coal from undisclosed coal mines in the Powder River Coal Field were also purchased by Consumers Power Company in November and December, 1990. Part of this coal was burned at Units 7 and 8 of the J.C. Weadock power station, Michigan. The remainder of the coal was used for testing.

23) Five coal producers from the Powder River Coal Field have signed contracts with Tennessee Valley Authority (TVA) to supply a total of 250,000 to 500,000 tons of coal to the Paradise, Kentucky, power plant. Cordero Mining Company's Cordero mine; Amax Coal Company's Belle Ayr mine; Thunder Basin Coal Company's Black Thunder mine; Triton Coal Company's Buckskin mine; and Nerco Coal Company's Antelope mine will each supply 50,000 tons with options for an additional 50,000 tons of coal (each). Although all transportation arrangements have not been completed, initial transportation out of Wyoming would be by rail with final delivery to Paradise by barge. The coal from each mine will be used separately and blended in varying amounts with coal from western Kentucky. Deliveries were scheduled to begin in January , 1991.

24) In December, 44,080 tons (40,000 metric tons) of coal from Kerr-McGee Coal Corporation's Jacobs Ranch mine were shipped to power plants operated by Endesa, Spain's national utility company. BN hauled the coal directly to the Port of Mobile, Alabama where it was loaded onto a ship to Spain. Carbotex, an international coal trading company, which arranged three previous coal sales between Wyoming producers and Spain, is apparently arranging a fifth coal sale to

Endesa from Amax Coal Company. The shipment from Kerr-McGee is the first to exit the United States through Mobile, Alabama. The previous Spanish coal sales exited through the port of New Orleans after traveling down the Mississippi River by barge.

Coal purchased for test burns is summarized below:

1) Consumer Power Company's purchase of 23,000 tons of spot coal from undisclosed coal mines (see item 22, above) includes coal that will be test burned in Unit No. 2 of the D.E. Karn power plant, Michigan.

2) Rochele Coal Company supplied 50,000 tons of coal from the Rochelle mine to Illinois Power Company's (IPC's) Hennepin, Illinois, power plant. The test burn at the facility's plant, which does not have a scrubber, was quite successful in that the plant reached 100 percent capacity on 100 percent Rochelle coal. The Hennepin plant normally burns high-sulphur coal from the Illinois Basin. BN hauled the coal to St. Louis where it was barged up the Illinois River to the plant.

3) Pacific Power and Light Company's (PP&L's) plans to test burn coal from Amax coal Company's Belle Ayr mine, Rochelle Coal Company's Rochelle mine, and Nerco Coal Company's Antelope mine during the third and fourth quarters of 1990 were delayed until the first half of 1991. The test burn was scheduled for the Jim Bridger plant at Point of Rocks, Wyoming. The only coal from the Powder River Coal Fields burned at Bridger so far has been from the Rochelle mine. The above three mines have furnished coal to PP&L's Dave Johnston, Wyoming. and Centralia, Washington, power plants.

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## INDUSTRIAL MINERALS AND URANIUM UPDATE

### Construction Aggregate

Construction aggregate is a sized rock material produced from gravel deposits or from crushed rock or gravel deposits. Production of construction aggregate in Wyoming declines during the winter months due to the seasonal downturn in construction projects in cold weather. During the third quarter of 1990, the production of construction aggregate in the United States was about 1.3% below the 1989 figure. This decline may foreshadow recessionary effects on the national construction industry. The relationship of this decline to the construction industry in Wyoming, however, remains to be seen since 1991 production of construction aggregate is not expected to decline.

Rissler-McMurray has received a mining permit for a new construction aggregate quarry on Bessemer Mountain west of Casper. The quarry, which is in the Triassic Alcova Limestone, is slated to begin operation as soon as February.

### Bentonite

Wyoming continues to lead the Nation in bentonite production. Bentonite production remained relatively constant through 1990 and is not expected to increase significantly in 1991 unless there is a major increase in domestic drilling for oil and gas.

## Decorative Aggregate and Stone

Decorative aggregate is sized rock produced for its color or other aesthetic qualities. it must have certain physical characteristics as well (strength, resistance to acid, etc.). Decorative aggregate is used in colored, prestressed concrete; roofing granules; landscape rock; building faces; etc. Decorative aggregate is produced in Wyoming by Georgia Marble, which operates Basins, Inc.'s white marble plant at Wheatland. The quarry is about 20 miles west of Wheatland. This material is known as "Wyoming White", and is used nationwide. All of the production from Wheatland is aggregate

There may soon be other decorative aggregate production in Wyoming. During late 1990, several samples of colored rock were tested by an Iowa-based epoxy tile manufacturer. In this use, colored rock is crushed and mixed with epoxy, then polished to produce sheets measuring 12'X 8' and smaller. Both salmon-colored and gray quartz from Platte County, as well as black granite from northern Albany County, were shipped to the producer for testing. Larger test shipments are expected in early 1991.

Although no decorative stone (uncrushed rock) is produced in Wyoming at the present time, at least four companies are investigating the possibility of locating decorative stone quarries in the State. Initially, 4'X 4' X 8' stone blocks will be quarried and shipped elsewhere for cutting and polishing. If warranted by demand and economics, stone processing plants could be located in Wyoming. Granite, quartzite, and marble in many colors are found in Wyoming, and one industry expert called a collection of colored stone samples from Wyoming, "a better collection than all the stones form the rest of the world". This collection is on display at the Geological Survey of Wyoming building in Laramie.

## Limestone

In Wyoming, limestone is now used as construction aggregate and in the production of cement. Other past uses of Wyoming limestone include sugar beet refining and the production of lime (CaO), a product with a wide variety of industrial uses.

In the latter part of 1990, Pete Lien, Inc. announced that it intended to open a limestone quarry and construct a lime plant near Laramie in response to an 11% increase in national demand for lime. The quarry, which is located three miles east of Laramie, is on a high-calcium limestone in the Permian-Pennsylvanian Casper Formation. An older quarry in the same area provided limestone for the cement plant in Laramie. A spokesman for Pete Lien estimated the quarry and lime plant would employ about 50 persons. The U.S. Bureau of Land Management is currently holding public hearings on the planned quarry and State and local permits must still be acquired before the quarry and plant are constructed.

## Fertilizer

Chevron Chemical Co. produces fertilizer in Rock Springs, Wyoming, from phosphate mined in Utah and from by-product sulfur produced in Wyoming. Phosphate is transported to the plant from a mine north of Vernal, Utah, by slurry pipeline. In November, 1990, Chevron announced that the plant was for sale. No buyer has been announced to date; and Chevron is apparently not planning to shut the plant down. The plant is the newest and most efficient fertilizer plant in the country. Phosphate-based fertilizer products are in

demand, but there is overproduction of phosphate fertilizer nationwide.

Trona

Wyoming's five trona mining companies, which produce a variety of sodium compounds from mined trona, continue to enjoy increased production and prices. 1990 was a record production year, and 1991 may be yet another record as new production lines and new plants are completed. In regard to State revenues, trona is the leading nonfuel mineral resource produced in Wyoming.

Uranium

After experiencing a price increase earlier in the year, Wyoming uranium prices fell in the fourth quarter of 1990. The earlier price rise was a result of increased demand for uranium by utilities. However, as demand increased and prices rose, foreign uranium stockpiles were dumped into the market at extremely low prices. Much of this uranium came from the Soviet Union. Lower prices have almost erased the 25% gain earlier in 1990. The year-end price for $U_3O_8$ was $9.80 per pound, compared to a high of about $12.00 per pound at mid-year, up from $8.10 per pound near the end of 1989. Uranium prices are no longer likely to reach the projected $20.00 price range. It is more likely that they will remain at $10.00 or less through 1991.

In Wyoming, Uranerz USA is applying for a uranium mining permit for a solution-mining (in-situ) operation located south of the Pumpkin Buttes. Although this mine is mostly in Johnson County, parts of the permit area are located in Campbell and Converse counties. Uranerz has not announced a date for beginning mine construction, but it is planning to wait for more favorable uranium marketing conditions.

Umetco Mineral Corp., formerly Union Carbide, owns uranium properties in the Gas Hills area in Wyoming. The company announced in December that it was closing all of its uranium mining and milling activities. This will not cause any changes in its Wyoming operations since they are all inactive or being reclaimed.

The American Nuclear Corporation, located in Casper, Wyoming, announced that it will accept low-level radioactive waste materials from other sites for disposal at an inactive uranium mine in the Gas Hills.

Pathfinder Mines has begun mining and milling uranium from a new ore body in the Shirley Basin. Pathfinder closed its mill early last year while stripping overburden from the new ore body. This is the only surface uranium mine and conventional mill operating in Wyoming. Power Resources is currently the only other uranium producer. It produces uranium form an in-situ operation north of Douglas in Converse County.

In October, President Bush signed legislation providing compensation to underground uranium miners or their families for health problems resulting from working in underground uranium mines in the 1940's, 1950's, and early 1960's. The bill as originally drafted did not compensate Wyoming miners. However, the bill was modified when it became known that there had been underground uranium mines in Wyoming.

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## METALS AND PRECIOUS STONES UPDATE

Mining companies conducted reconnaissance studies of some mineral deposits (principally gold and copper) this past field season. And a group of South Dakota mining companies, upset with unfair treatment in that state, contacted the Metals and Precious Stones Division for information and assistance in locating potentially commercial gold deposits in the Cowboy State. These latter companies plan to invest exploration dollars in Wyoming in order to find minable gold deposits.

The author traveled to the Northwestern Mining Association conference in December and presented a paper on the exploration activity and geology of metal deposits in Wyoming (Hausel, 1990a). Since the presentation, there has been increased interest in some of the States's gold deposits as well as significant interest in the State's copper deposits. The mining industry's increased interest in copper suggests that the market for base metals may remain relatively strong in the near future. Contact W. Dan Hausel or the Publications Division of the Survey for copies of the paper titled, "Precious and base metal deposits in Wyoming".

Deposits attracting the greatest amount of interest are the giant porphyry copper-silver deposits (with associated gold,lead,zinc,and molybdenum) in the Absaroka Mountains (in particular, Kirwin and Sunlight Basin), the red bed copper-silver-zinc-lead deposits of the Lake Alice district in the Overthrust Belt, and the Ferris-Haggarty stratabound quartzite-hosted copper deposit in the Sierra Madre.

### Bear Lodge District (Black Hills)

Gold properties in the Bear Lodge Mountains in the northwestern Black Hills of northeastern Wyoming have been receiving considerable exploration interest over the past years. Mineralization in the district occurs as disseminated gold in feldspathic breccia. Some historic reports also described gold in fluorite veins although fluorite samples recently collected by the Geological Survey of Wyoming contained no detectable gold. Exploration in this region has been conducted by Molycorp, FMC Gold, Hecla Mining, International Curator Resources, and Coca Mines.

The most recent interest in the district is from Coca Mines, which reportedly leased 1,480 acres of unpatented mining claims on their Sundance project. According to the Engineering and Mining Journal, October, 1990, p. 43, the company planned to drill 36 additional holes during the third quarter of 1990 to confirm the extent of mineralization. Initial drilling showed gold mineralization to vary from 30 to 195 feet thick with an average grade of 0.025 ounce per ton. The Sundance property is apparently the same deposit drilled by International Curator Resources. In their 1988 Annual Report, International Curator reported the discovery of a 2,000-foot long by 120-foot wide intrusive breccia grading from 0.01 to 0.05 ounce per ton gold.

### Seminoe Mountains

Geologically, the Seminoe Mountains represent a relatively young (2.7 to 2.9 billion-year-old) greenstone belt with lower, mafic to ultramafic metavolcanic unit having an apparent thickness of nearly 10,000 feet. This lower unit is overlain by an ultramafic unit with nearly 1,000 feet of serpentinites and

spinifex-textured basaltic and peridotitic komatiites, which in turn is overlain by several hundred feet of banded iron formation, clastic metasediments,felsic metavolcanics, and metagabbro. Gold in the greenstone belt occurs in veins associated with pervasive chloritic alteration, sulfides, quartz, and calcite.

The Geological Survey of Wyoming continued field studies in the Seminoe Mountains greenstone belt throughout the summer and fall. Many samples were collected for laboratory work and detailed mapping of lithologies and structures continued. A new map of the western portion of the Seminoe Mountains greenstone belt (Bradley Peak Quadrangle) will soon be completed and available as an open file report. Mapping on the Seminoe Dam Quadrangle will begin next summer.

The available sample analyses show the presence of ultramafic rocks with relatively high chromium and nickel. Also of interest, are the numerous weak precious metal anomalies detected in banded iron formation. The Geological Survey of Wyoming initiated a long-term project last summer to test for precious metals in banded iron formation throughout the State. Considering the importance of gold-bearing banded iron formation elsewhere (i.e., Jardine, Montana;Homestake, South Dakota; and numerous properties in Zimbabwe) and the abundance of iron formation in Wyoming, such a project is considered high priority.

South Pass

Goldstake Exploration continued exploring and testing their property in the South Pass greenstone belt this past summer. No results are available at this time.

A final report on the Geological Survey of Wyoming's six-year study of this greenstone belt will describe numerous gold and iron deposits and anomalies, and some silver, copper, tungsten, tin, and chromium anomalies. The results suggest the greenstone belt contains several possibly commercial mineral deposits, a high potential for the discovery of near-surface hidden gold deposits, and the potential for some hidden giant gold deposits. This report should be available in the first quarter of 1991.

Union Pacific Resources (Minerals) provided the Geological Survey of Wyoming with a $20,000 grant for 1991 to conduct applied research related to the distribution and occurrence of gold and diamond along the railroad land grant in southern Wyoming. This grant will provide the Survey with an opportunity to look for gold, diamonds, and other valuable minerals in a variety of unusual geological environments that have been overlooked in the past. Since 1980, the Survey has been accumulating data on precious metals and stones (see Albert, 1986; Hausel and others, 1988; Hausel, 1989) and it has become apparent that there are numerous anomalies in some atypical environments.

Some areas slated for study in the Greater Green River Basin of Carbon, Sweetwater, and Uinta counties include the potential for gold, diamonds, or other valuable metals and minerals in lamproites in the Leucite Hills, in Cretaceous titaniferous black sandstones, in coal, in oil shale, in uraniferous sandstones, in sand and gravel deposits, and in an extensive alunite-silica deposit. In Albany, Carbon, and Laramie counties, the Survey will investigate a large disseminated gold-copper deposit, some vein deposits, a titaniferous black sandstone, and some sand and gravel deposits.

These areas were considered for this study because: (1) similar titaniferous black sandstone have been gold-bearing elsewhere, (2) the Leucite Hills' lamprocites are mineralogically and chemically similar to diamondiferous lamproite in Arkansas and Western Australia, (3) gold anomalies have been reported in coal at three other location in Wyoming, (4) in 1922, the U.S, Bureau of Mines reported anomalous gold in oil shale near Rock Springs and Green River, and no known follow-up studies have occurred, (5) anomalous gold has been reported in uranium roll fronts elsewhere in Wyoming (Gordon Marlatt, personal communication, 1988), (6) sand and gravel deposits often carry gold, (7) an extensive zone of silicification and alunite in the Green River Basin is mineralogically similar to hydrothermal alteration associated with extensive disseminated gold deposits in Nevada, and (8) the disseminated gold-copper deposit and the vein deposits are similar to commercial deposits mined elsewhere in the world.

This reconnaissance study is scheduled for completion by the end of 1991, but it could be continued if favorable results are obtained.

## Diamonds

The Geological Survey of Wyoming resumed its exploration for diamond deposits this past summer under a grant from the University of Wyoming's Mining and Mineral Resource Research Institute. To date the project has revealed numerous heavy mineral anomalies in the Laramie Mountains (Hausel and others, 1988). The project apparently has attracted the interest of diamond exploration firms in that the Survey has recently been contacted by a consulting firm looking at the feasibility of testing diamondiferous kimberlite in the State Line district south of Laramie. There are also reports that a major international diamond mining company has been exploring both the Bighorn and Gros Ventre Mountains over the past few years.

## Joint WGA-UW-WGS Field Conference

In 1991, The Wyoming Geological Association (WGA), the University of Wyoming's Department of Geology and Geophysics (UW), and the Geological Survey of Wyoming (WGS) will jointly host the WGA's annual field conference, which will be held in Laramie, Sept. 14-18. The theme of the conference is mineral resources of Wyoming. Tentatively, the conference will start with pre-conference field trips to the Seminoe and South Pass gold and iron districts, followed by one day of papers and(or) talks on gold, copper, coal, diamond, petroleum, rare earths, industrial minerals, construction materials, titaniferous magnetite, uranium, vanadium, platinum, and palladium. Tours of the Anaconda Collection in the Archive of Economic Geology of the American Heritage Center are also planned. The conference will end with two days of post-conference field trips. The post-conference trips currently include (1) the Hanna Coal Field, (2) industrial mineral deposits in southeastern Wyoming, and (3) the anorthosite complex and associated titaniferous magnetite deposits, diamond deposits, in the State Line district, and the geology of the Medicine Bow Mountains.

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Table 1. AVERAGE PRICE PAID FOR WYOMING OIL, NATURAL GAS, COAL, TRONA, AND URANIUM, FORECAST TO 1994[1].

| Calendar Year | Oil[2] | Natural Gas[3] | Coal[4] | Trona[5] | Uranium[6] |
|---|---|---|---|---|---|
| *1985 | 23.61 | 3.03 | 11.35 | 35.18 | 36.82 |
| *1986 | 13.10 | 2.51 | 10.71 | 34.80 | 52.45 |
| *1987 | 16.50 | 2.02 | 9.54 | 36.56 | 43.55 |
| *1988 | 13.41 | 1.74 | 9.09 | 36.88 | 25.77 |
| *1989 | 16.64 | 1.64 | 8.63 | 40.76 | 22.09 |
| 1990 | 20.00 | 1.64 | 8.29 | 44.00 | 19.00 |
| 1991 | 23.00 | 1.80 | 7.94 | 45.00 | 20.00 |
| 1992 | 23.00 | 1.98 | 7.59 | 46.00 | 21.00 |
| 1993 | 23.00 | 2.18 | 7.24 | 46.00 | 21.50 |
| 1994 | 23.00 | 2.40 | 6.99 | 47.00 | 22.00 |

* Actual value for comparison.
[1] Modified from Consensus Revenue Estimating Group, Wyoming State Government Revenue Forecast FY91-FY95, October, 1990, 18 p.
[2] First purchase price in dollars per barrel.
[3] Wellhead price in dollars per MCF (includes carbon dioxide).
[4] Dollars per short ton (weighted average price for coal mined by surface and underground methods).
[5] Dollars per ton of trona.
[6] Uranium prices are all estimated by the Geological Survey of Wyoming (January, 1991); in dollars per pound of yellowcake (weighted average price for in-situ and surface-mined uranium).

Table 2. WYOMING MINERAL PRODUCTION, FORECAST TO 1994[1].

| Calendar Year | Oil[2] | Methane[3] | Carbon Dioxide[3] | Helium[4] | Coal[5] | Trona[5] | Mined Uranium[6] | In-situ Uranium[7] | Sulfur[8] |
|---|---|---|---|---|---|---|---|---|---|
| *1981 | 122.1 | 455.4 | — | — | 102.8 | 11.8 | 4.6 | — | 0.05 |
| *1982 | 118.7 | 465.1 | — | — | 107.9 | 10.1 | 2.1 | — | 0.07 |
| *1983 | 120.9 | 539.7 | — | — | 112.2 | 10.5 | 3.0 | — | 0.57 |
| *1984 | 127.8 | 600.1 | — | — | 130.7 | 11.0 | 1.6 | — | 0.63 |
| *1985 | 131.0 | 597.9 | — | — | 140.4 | 10.8 | 0.6 | — | 0.80 |
| *1986 | 122.4 | 563.2 | 23.8 | 0.15 | 136.3 | 13.3 | 0.3 | — | 0.66 |
| *1987 | 115.9 | 619.0 | 114.2 | 0.86 | 146.5 | 13.6 | 0.2 | 0.06 | 1.19 |
| *1988 | 114.3 | 701.6 | 110.0 | 0.83 | 163.6 | 14.9 | 0.3 | 1.40 | 0.96 |
| *1989 | 109.1 | 739.0 | 126.1 | 0.94 | 171.1 | 16.2 | 0.1 | 1.07 | 1.07 |
| 1990 | 104.4 | 777.0 | 127.0 | 0.95 | 179.2 | 16.9 | 0.45 | 1.0 | 1.10 |
| 1991 | 102.3 | 795.0 | 127.0 | 0.95 | 187.6 | 17.5 | 0.45 | 1.5 | 1.10 |
| 1992 | 100.3 | 894.0 | 127.0 | 0.95 | 196.4 | 18.5 | 0.45 | 4.0 | 1.10 |
| 1993 | 98.3 | 1,015.0 | 127.0 | 0.95 | 205.0 | 20.0 | 0.45 | 4.0 | 1.10 |
| 1994 | 96.3 | 1,034.0 | 127.0 | 0.95 | 214.0 | 20.0 | 0.45 | 6.0 | 1.10 |

*Actual values for comparison; [1]Geological Survey of Wyoming, January, 1991; [2]millions of barrels; [3]billions of cubic feet; [4]billions of cubic feet, based on Exxon's estimate that the average helium content in the gas processed at Shute Creek is 0.5 percent; [5]millions of tons; [6]millions of tons of uranium ore (not yellowcake); [7]millions of pounds of yellowcake ($U_3O_8$), (unknown between 1981-1986 because it was reported only as taxable valuation; estimates for 1989-1994 are based on company information); [8]millions of tons (prior to 1989, converted from gallons of sulfur produced at gas processing plants as reported to the Wyoming Oil and Gas Conservation Commission).

# Wyoming Agricultural Update

Price movements for U.S. agricultural commodities will be mixed during the 1991 marketing year. Average prices of wheat, milk, barley, and oats are expected to be lower than during the 1990 marketing year, while prices of corn, soybeans and most meats will remain about the same or increase slightly.

The mix of crops planted by U.S. farmers in 1991 is anticipated to change more than in recent years. This response is partially due to the planting flexibility provisions of the new farm bill and to changing market prices. For example, plantings of oil seeds and corn are expected to rise, while wheat acreage will decline.

The USDA forecasts indicate that U.S. agricultural exports will fall $1.6 billion to $38.5 billion in fiscal 1991. Export volume is projected to decline by 6 percent. This drop is anticipated due to larger harvests in traditional importing countries and export competitor countries.

Beef production is expected to increase 1 percent during 1991 over the 1990 production. Pork production likely will increase 3 percent and lamb and mutton output should be about the same as last year. Broiler output growth will slow to a 5-6 percent increase, while turkey production will increase 5-7 percent. Thus, poultry will remain a strong competitor with red meats for the consumer meat dollar.

Overall, total cash receipts from crops are expected to rise slightly, while total livestock receipts will remain at about the 1990 level. Higher expenses and lower government payments will exert downward pressures on income. Net cash income earned by agricultural producers will be down 2-3 percent from the record $59 billion in 1990. Net farm income, the value of production plus government payments less all costs during the calendar year, is expected to decline 5 percent.

## Grains Overview

Primary factors impacting U.S. grain markets include weather, stocks, U.S. exports and agricultural policy. World wheat supplies were limited by weather in 1988/89 and 1989/90, resulting in reduced stocks and increased prices. At the beginning of 1990/91, stocks-to-use ratios were the lowest in decades, both in the U.S. and the rest of the world. In 1990/91, this situation changed dramatically. Record foreign wheat production, near-record U.S. output and only modest growth in use combined to flood the wheat market. Large wheat crops in both importing and exporting countries suggest no or little change in expected volume for world trade. Export prices for wheat have fallen dramatically since the beginning of the marketing year, however, the low prices are not stimulating an increase in imports.

A higher Acreage Reduction Program requirement, new program flexibility provisions, and prospects for stronger prices for alternative crops will undoubtedly reduce wheat plantings in the U.S. for the 1991 crop year. Wheat sales in 1991 are expected to be down as much as $2 billion, as a result of reduced planted acreage and a market price below the 1990 average. The lower price will be primarily due to increased stocks from increased world output. Most analysts are bearish on the wheat market with a hard red winter wheat average price for 1990/91 projected at $2.80 per bushel. Projected prices for 1991/92 are projected to be about

$.50 per bushel lower.

For 1991, U.S. corn acreage is expected to increase 1-3 million acres. This assumes the minimum Acreage Reduction Program level and little net shift in corn plantings because of the flexibility provisions of the 1990 farm bill. With trend yields, this would increase expected production 2-6 percent. The forecast for corn used as feed and residual uses is at 4,850 billion bushels, up about 5 percent from a year earlier due to favorable returns in the livestock sector. Food, seed and industrial use of corn is predicted to increase 2.3 percent in 1990/91 from a year earlier to 1,320 million bushels. The largest increases will be in the production of high fructose corn syrup and alcohol.

Following four years of increases, exports are expected to decline to 1,925 million bushels in 1990/91. Currently, U.S. corn stocks at the end of the 1090/91 crop year are projected to be 1,185 million bushels, compared to 1,344 million bushels ending stocks in the previous crop year. The stocks-to-use ratio at the end of the current crop year is expected to be 14.6 percent, lower than the 16.5 percent at the end of the last crop year and also lower than the drought year of 1983/84 when this ratio was 15 percent. In summary, the U.S. is facing an apparent tight stocks situation for corn. Even though export demand at present is slow, anything less than good growing weather this spring and summer could reduce stocks further which would be quite bullish. Market prices are forecast to average $2.20-$2.50 per bushel.

## Livestock Situation

A modest cattle herd expansion appears to be underway and likely will last through the mid-1990s. Even with favorable cow-calf operator returns, the herd rebuilding has been quite constrained, compared with previous periods of positive returns. The herd is expected to peak well below the highs of earlier cycles. However, trends toward a smaller percentage of calf slaughter and more meat per animal may increase the quantities of meat available.

U.S. beef exports increased dramatically during the 1980s--from 200 million pounds carcass weight to about a billion pounds by the end of the decade. This was primarily due to the opening of Pacific Rim markets. Beef exports are forecast to be unchanged or up slightly in 1991 from 1990. U. S. beef imports are expected to decrease slightly in 1991 from the 1990 2.3 billion pounds carcass weight.

Fed cattle marketings during the first quarter of 1991 should average 2-4 percent above the 1990 first quarter marketings. However, fewer cows slaughtered will offset some of the increases in cattle marketings. Increases in pork, broiler, and turkey supplies will exert some additional downward pressure on cattle prices. Choice steer prices are expected to trend lower into the summer months. Typical feedlot placement and marketing patterns would suggest choice steerprices in the mid to low $70 average in July-September.

The supply of feeder cattle will remain tight in 1991 due to reduced calf crops during the last few years and the incentive to retain heifers for replacements. Favorable cattle feeding-margins also should support feeder cattle and calf prices in 1991. Prices for 600-700 pound feeder steers in Kansas City are forecast to hold near or above the 1990s $90 per cwt.

Demand for cattle to put on grass should be strong this spring. Summer grazing operations will be competing with cattle feeders for available cattle supplies. Grazing returns have been favorable in recent years. Moreover, low wheat prices and changes in the 1990 farm bill may make wheat graze-out and attractive alternative, leading to even

more competition for tight cattle supplies.

World wool supplies continue to exceed demand leading to large and growing world stocks during late 1990. The Australian Wool Corporation, New Zealand Wool Board and South African Wool Board each has large stocks due to market conditions forcing the purchase of a substantial portion of the 1990 wool crop in their respective countries. Although 1991 production is expected to be down, world wide weak demand and large stocks suggest a weak wool market.

Lamb production is expected to be about the same in 1991 as in 1990 at 363 million pounds. USDA forecasts the lamb price to average $53 to $59 through early 1991.

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# Job Openings Outlook

## FARMERS AND RANCHERS

Farmers and ranchers are responsible for the production of agricultural goods. Since farms and ranches are increasing in size and mechanization, farming often involves large capital outlays, numerous skills, and much time and energy. The duties of a farmer or rancher are determined by the size and type of farm or ranch. The typical farmer or rancher is manager, crew boss, laborer, and bookkeeper. They must also be knowledgeable about all phases of farming and ranching such as crop growth, insect and disease control, livestock, and federal and state regulations that apply to farm practices. Large farms sometimes hire managers to oversee and coordinate farming activities.

Farmers and ranchers must possess a wide range of aptitudes and skills. For example, they must understand and apply agricultural principles, possess managerial skills, and know how to operate a business. They must also be willing to try new processes and adapt to constantly changing techniques. For farmers and ranchers, knowledge of agricultural principles, equipment operation, building maintenance, breeding, and pest control are helpful, if not essential. Skills in business management and accounting are becoming increasingly important. Farmers and ranchers work long hours, both indoors and outdoors in all types of weather conditions and so must have good physical stamina. A 6- or 7-day workweek is common during busy seasons and is the rule on certain types of farms.

Although no formal education or training is required, time spent on a farm or ranch as a youth and taking part in programs such as Future Farmers of America or 4-H are both significant ways of gaining knowledge and experience. Experience in farming and ranching is the most important requirement for operating or owning a farm or ranch. However, because modern farming and ranching is becoming more complex, post-secondary training can also be vital, particularly for persons who have not lived or worked on a farm or ranch.

Annual income for farmers and ranchers varies with the size and type of farm or ranch. Earnings also vary from year to year; a ranch or farm may make a profit one year and have a loss the next. Factors that affect earnings include the weather, crop or livestock disease, crop or livestock prices, and the cost of items such as seed, fertilizer, fuel, and machinery. Nationally, median annual earnings range between $15,000 and $30,000. Start-up costs are high because a large amount of money is needed in order to buy land, equipment, and buildings.

This occupation is very large in Wyoming, employing about 6,690 people. However, employment is expected to decline due to the state of the economy. Factors which will contribute to this decline include the rising cost of operating a farm or ranch, high interest rates, inflationary prices for farm supplies and equipment, and depressed prices for crops and livestock. These factors will also contribute to the trend toward larger but fewer farms and ranches. Smaller farm and ranch operators will have an increasingly hard time competing in the farm and ranch industry. There will be limited opportunities because of the large start-up costs. Therefore, employment opportunities exist for individuals with enough money to purchase the land, equipment, and supplies, for individuals who enter through a family-owned business, or for those who start as a farm manager. Nationally, employment is expected to continue to decline through the year 2000. Requirements for farm land, machinery, and equipment will increase but labor requirements will decrease due to increasing productivity in our highly efficient agricultural sector.

## ANIMAL CARETAKERS

Animal caretakers are responsible for the welfare of animals in places such as shelters, animal hospitals, and zoos. They feed, water, bathe, groom, and exercise animals. They may

treat minor injuries or ailments, repair equipment and cages, and sweep and clean animal quarters. Animal caretakers include veterinary assistants and farriers (horseshoer). Working under the supervision of a veterinarian, veterinary assistants may give emergency first-aid treatment, collect specimens, take x-rays, and do laboratory analyses. Sometimes they use equipment, prepare animals for surgery, and do surgical nursing. They are also called animal technicians. Farriers remove shoes from the horse's hooves, examine the hooves for bruises and cracks, and then trim and shape the hooves. They select aluminum and steel shoes and fit, shape, and nail the shoes to the hooves.

Animal caretakers must have the physical ability to lift objects weighing anywhere from 10 to 50 pounds and be able to maintain a patient and humane attitude toward animals. Caretakers must also have knowledge of animal habits, needs, physiology, and the general principles of nutrition, sanitation, and animal hygiene. They must have verbal and numerical skills in order to keep routine records such as feeding logs. Farriers need an average ability to see detail, visualize objects of two or three dimensions, and be able to do precise work. They must also be knowledgeable about corrective shoeing techniques, use of tools, and the proper shoe to use, depending on the condition of the horses' hooves and legs. Welding and other forging skills are needed to make and shape shoes. Technicians must know laboratory procedures, medical and animal surgical assisting techniques, pharmacology, and x-ray machine operation. They must also be familiar with animal diseases and parasites as well as anesthetic agents.

Animal caretakers work both indoors and outdoors. Some jobs such as animal control workers spend most of their time outdoors. Farriers often work outdoors and frequently travel to remote work sites such as farms and ranches. Others such as veterinary assist-ants, lab helpers, or pet shop attendants work mainly indoors. The possibility of being scratched, kicked, or bitten by frightened or nervous animals is always present. Caretakers may be exposed to strong odors from animals, medical preparations, and disinfectants.

Many employers provide training on the job. College courses in animal husbandry, zoology, or similar subjects would benefit anyone interested in working with animals. There is a 2-year animal health technology program in Wyoming to train individuals in veterinary assisting. Many farriers learn their skills by assisting experienced farriers; however, formal training is also available.

This small occupation in Wyoming employs about 100 animal caretakers. Most employers of animal caretakers have no difficulty finding workers because of the fairly low entry-level skill and educational requirements and popularity of positions working with animals. Currently turnover is low because of the economy. Outlook depends on services added to meet the needs of a growing pet population, an increase in animal research and facilities, and replacement of people who leave their jobs. Those with training or experience in animal technology or a related field will fare best. The availability of work for farriers depends on the season. Peak season is the summer time and work is abundant. Farriers entering this field must often compete with others for clientele.

Animal caretakers' wages vary with employer, responsibility, and skills. Animal caretakers earn between $4.00-5.00 per hour. Veterinary assistants entry wage averages around $4.35 per hour. However some earn as much as $7.20 per hour. Farriers receive around $10.00-18.00 per horse depending on the service. If the farrier travels to the work site, the average rate is around $25.00-30.00 per horse. Nationally, the median annual salary for animal caretakers is $10,972 per year. However, national earnings can range from $7,392 to 17,940 per year.

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Coordinator, WCIS

# 1990 Census: U.S. Population

1990 Population and Number of Representatives, By State

| State | Apportionment Population | Resident Population | Number of Representatives 1990 | 1980 | Change |
|---|---|---|---|---|---|
| UNITED STATES | 249,632,692 | 248,709,873 | 435 | 435 | |
| Alabama | 4,062,608 | 4,040,587 | 7 | 7 | |
| Alaska | 551,947 | 550,043 | 1 | 1 | |
| Arizona | 3,677,985 | 3,665,228 | 6 | 5 | 1 |
| Arkansas | 2,362,239 | 2,350,725 | 4 | 4 | |
| California | 29,839,250 | 29,760,021 | 52 | 45 | 7 |
| Colorado | 3,307,912 | 3,294,394 | 6 | 6 | |
| Connecticut | 3,295,669 | 3,287,116 | 6 | 6 | |
| Delaware | 668,696 | 666,168 | 1 | 1 | |
| District of Columbia | 609,909 | 606,900 | 0 | 0 | |
| Florida | 13,003,362 | 12,937,926 | 23 | 19 | 4 |
| Georgia | 6,508,419 | 6,478,216 | 11 | 10 | 1 |
| Hawaii | 1,115,274 | 1,108,229 | 2 | 2 | |
| Idaho | 1,011,986 | 1,006,749 | 2 | 2 | |
| Illinois | 11,466,682 | 11,430,602 | 20 | 22 | -2 |
| Indiana | 5,564,228 | 5,544,159 | 10 | 10 | |
| Iowa | 2,787,424 | 2,776,755 | 5 | 6 | -1 |
| Kansas | 2,485,600 | 2,477,574 | 4 | 5 | -1 |
| Kentucky | 3,698,969 | 3,685,296 | 6 | 7 | -1 |
| Louisiana | 4,238,216 | 4,219,973 | 7 | 8 | -1 |
| Maine | 1,233,223 | 1,227,928 | 2 | 2 | |
| Maryland | 4,798,622 | 4,781,468 | 8 | 8 | |
| Massachusetts | 6,029,051 | 6,016,425 | 10 | 11 | -1 |
| Michigan | 9,328,784 | 9,295,297 | 16 | 18 | -2 |
| Minnesota | 4,387,029 | 4,375,099 | 8 | 8 | |
| Mississippi | 2,586,443 | 2,573,216 | 5 | 5 | |
| Missouri | 5,137,804 | 5,117,073 | 9 | 9 | |
| Montana | 803,655 | 799,065 | 1 | 2 | -1 |
| Nebraska | 1,584,617 | 1,578,385 | 3 | 3 | |
| Nevada | 1,206,152 | 1,201,833 | 2 | 2 | |
| New Hampshire | 1,113,915 | 1,109,252 | 2 | 2 | |
| New Jersey | 7,748,634 | 7,730,188 | 13 | 14 | -1 |
| New Mexico | 1,521,779 | 1,515,069 | 3 | 3 | |
| New York | 18,044,505 | 17,990,455 | 31 | 34 | -3 |
| North Carolina | 6,657,630 | 6,628,637 | 12 | 11 | 1 |
| North Dakota | 641,364 | 638,800 | 1 | 1 | |
| Ohio | 10,887,325 | 10,847,115 | 19 | 21 | -2 |
| Oklahoma | 3,157,604 | 3,145,585 | 6 | 6 | |
| Oregon | 2,853,733 | 2,842,321 | 5 | 5 | |
| Pennsylvania | 11,924,710 | 11,881,643 | 21 | 23 | -2 |
| Rhode Island | 1,005,984 | 1,003,464 | 2 | 2 | |
| South Carolina | 3,505,707 | 3,486,703 | 6 | 6 | |
| South Dakota | 699,999 | 696,004 | 1 | 1 | |
| Tennessee | 4,896,641 | 4,877,185 | 9 | 9 | |
| Texas | 17,059,805 | 16,986,510 | 30 | 27 | 3 |
| Utah | 1,727,784 | 1,722,850 | 3 | 3 | |
| Vermont | 564,964 | 562,758 | 1 | 1 | |
| Virginia | 6,216,568 | 6,187,358 | 11 | 10 | 1 |
| Washington | 4,887,941 | 4,866,692 | 9 | 8 | 1 |
| West Virginia | 1,801,625 | 1,793,477 | 3 | 4 | -1 |
| Wisconsin | 4,906,745 | 4,891,769 | 9 | 9 | |
| Wyoming | 455,975 | 453,588 | 1 | 1 | |

Note: The 1990 population counts set forth herein are subject to possible correction for undercount or overcount. The U. S. Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991.

# FYI

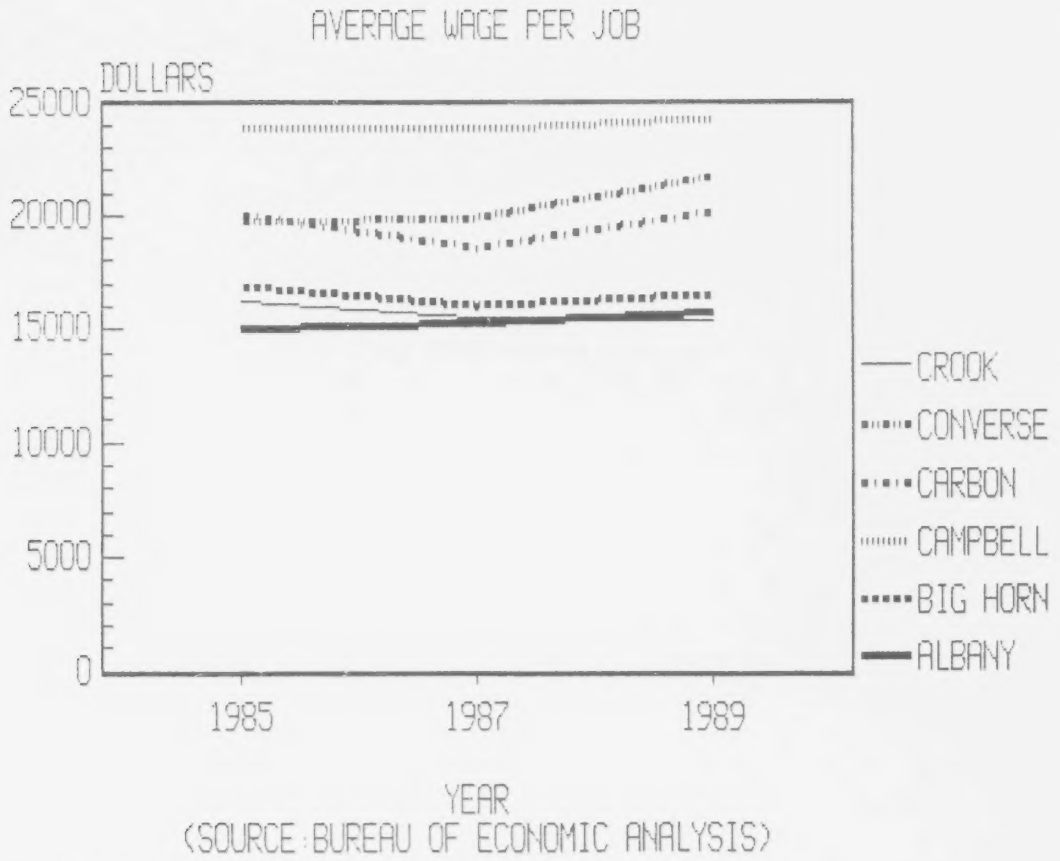
Population Distribution for Wyoming by Race and Hispanic Origin: 1990 and 1980

| WYOMING | 1990 | | 1980 | | Number Change | Percent Change |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | | |
| Total Population..... | 453,588 | 100.0 | 469,557 | 100.0 | -15,969 | -3.4 |
| White..... | 427,061 | 94.2 | 446,488 | 95.1 | -19,427 | -4.4 |
| Black..... | 3,606 | 0.8 | 3,364 | 0.7 | 242 | 7.2 |
| American Indian, Eskimo, or Aleut..... | 9,479 | 2.1 | 7,094 | 1.5 | 2,385 | 33.6 |
| Asian or Pacific Islander..... | 2,806 | 0.6 | 1,969* | 0.4 | 837 | 42.5 |
| Other Race..... | 10,636 | 2.3 | 10,642 | 2.3 | -6 | -0.1 |
| Hispanic Origin**..... | 25,751 | 5.7 | 24,499 | 5.2 | 1,252 | 5.1 |

* This 1980 number, based on 100-percent tabulations, includes all groups listed separately in the race question. Write-in responses for groups such as Cambodian, Thai, Laotian, and Fiji Islander were not included in 100-percent totals for the Asian or Pacific Islander population but were included in the Asian or Pacific Islander total in all sample tabulations.

** Persons of Hispanic origin can be of any race.

THE POPULATION COUNTS SET FORTH HEREIN ARE SUBJECT TO POSSIBLE CORRECTION FOR UNDERCOUNT OR OVERCOUNT. THE UNITED STATES DEPARTMENT OF COMMERCE IS CONSIDERING WHETHER TO CORRECT THESE COUNTS AND WILL PUBLISH CORRECTED COUNTS, IF ANY, NOT LATER THAN JULY 15, 1991.




(SOURCE: BUREAU OF ECONOMIC ANALYSIS)

# Agricultural Loan Volume And Market Share Trends in Wyoming, 1976-1990

This article presents information on trends in agricultural loan volume in Wyoming during the period 1976 to 1990. It also shows the relative market shares held by the major agricultural lenders, as well as trends in market shares. The report should be useful to individuals interested in the agricultural finance sector including bankers and other credit officers, public policy officials, and farmers and ranchers.

Agricultural loan volume outstanding in Wyoming stood at $962 million on January 1, 1990[1] (table 1). This represented a decline of 25.9 percent from the peak of $1,298 million on January 1, 1984. This marks the sixth consecutive year in which total agricultural loans outstanding have declined. Decreases took place in both real estate loans (from $724 to $576 million) and non-real estate loans (from $573 to $386 million).

When broken down by source, $483 million of the 1990 volume outstanding is from private credit sources including commercial banks and individuals. Government credit agencies, including Farmers Home Administration (FmHA), Wyoming Farm Loan Board (WFLB), and Commodity Credit Corporation (CCC), accounted for $340 million. The remaining $139 million was provided by government-sponsored agencies in the Farm Credit System (FCS). Compared to 1976 totals, private source lending increased from $419 million to $483 million, or 15.2 percent, while government and government-sponsored credit increased by 74.8 percent from $274 million to $479 million (figure 1). With the increase in government and government-sponsored credit assistance between 1976 and 1990, this source became about equal to private lending in agriculture. Outstanding agricultural loans increased steadily from $691 million on January 1, 1976, to a peak of $1,298 million on January 1, 1984 (table 1). Outstanding loan volume declined each year from January 1, 1984, to January 1, 1990, for a total reduction of $336 million or 25.9 percent.

Commercial banks, with $243 million outstanding as of January 1, 1990, had the largest market share (about 25 percent) followed by the Wyoming Farm Loan Board (WFLB) wit $238 million. "Individuals and others" had $157 million, the Farm Credit System had $139 million, insurance companies had $83 million, and Farmers Home

[1]The figures presented are based on data from Economic Research Service USDA and Wyoming Department of Public Lands.

Administration had $99 million.

Compared to 1976, the WFLB and FmHA have increased their market share substantially while the FCS, commercial banks, and insurance companies have reduced market shares. There was little change in the market share held by "individuals and others."[2]

Real Estate Loans

The rapid increase in land values in Wyoming and the United States during the 1970s contributed to the very significant increase in real estate loan volume during that period. The decline of real estate values after reaching their peak in the early 1980s into 1987 and mid-1988 resulted in a substantial decrease in real estate loans outstanding since 1984 (Vanvig and Hewlett, 1988).

Real Estate loans for Wyoming agricultural property come from six major sources: the FCS, Federal Land Bank (FLB), "individuals and others", life insurance

Table 1. Agricultural loans in Wyoming by lender as of January 1, 1976-1990

| Year | Farm Cred. Svc. (FCS)* | Commercial Banks | Ins. Co's. | FmHA | WFLB | Individuals & others | CCC | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | $ Million $ | | | | |
| 1976 | 182 | 203 | 84 | 47 | 45 | 130 | 0 | 691 |
| 1977 | 199 | 237 | 87 | 52 | 53 | 149 | 2 | 779 |
| 1978 | 196 | 235 | 117 | 61 | 65 | 169 | 6 | 849 |
| 1979 | 229 | 220 | 120 | 99 | 66 | 206 | 9 | 949 |
| 1980 | 283 | 225 | 137 | 124 | 71 | 237 | 6 | 1083 |
| 1981 | 310 | 227 | 143 | 135 | 74 | 242 | 7 | 1138 |
| 1982 | 347 | 238 | 144 | 137 | 93 | 251 | 11 | 1221 |
| 1983 | 357 | 268 | 139 | 130 | 114 | 251 | 14 | 1273 |
| 1984 | 345 | 288 | 138 | 128 | 136 | 250 | 13 | 1298 |
| 1985 | 313 | 301 | 137 | 129 | 153 | 242 | 11 | 1286 |
| 1986 | 224 | 281 | 120 | 133 | 191 | 224 | 13 | 1186 |
| 1987 | 192 | 250 | 111 | 129 | 227 | 191 | 13 | 1113 |
| 1988 | 152 | 248 | 96 | 127 | 239 | 173 | 12 | 1035 |
| 1989 | 141 | 236 | 80 | 122 | 235 | 166 | 6 | 986 |
| 1990 | 139 | 243 | 83 | 99 | 238 | 157 | 3 | 962 |
| Percentage of total | | | | | | | | |
| 1976 | 26 | 29 | 12 | 7 | 7 | 19 | | 100 |
| 1981 | 27 | 20 | 12 | 12 | 7 | 21 | 1 | 100 |
| 1986 | 19 | 24 | 10 | 11 | 16 | 19 | 1 | 100 |
| 1988 | 14 | 24 | 9 | 12 | 23 | 17 | 1 | 100 |
| 1990 | 15 | 25 | 9 | 10 | 25 | 16 | | 100 |

*Includes Federal Loan Bank (FLB), Production Credit Association (PCA), and Federal Intermediate Credit Bank (FICB)

[2]A more detailed discussion of credit sources is found in Vanvig,Andrew and Alan Collins, Credit for Wyoming Agricultural and Commercial Sectors:The Scope and Size of Public Lending Programs, February 1987, Bulletin 880, Agricultural Experiment Station, University of Wyoming.

companies, the WFLB, the FmHA, and commercial banks.Real estate loans include those for land and real property improvements as well as land purchase, all of which are backed by real property collateral. The loans from the "individuals and others" category are largely accounted for by seller-financed sales.

Between 1976 and 1990, the total volume of outstanding agricultural real estate loans nearly doubled from $364 million to $576 million (table 2). The state agency WFLB had the greatest increase, particularly in the last seven years. The WFLB showed an increase of $102 million in volume since 1984. Growth in real estate loans outstanding slowed in the early 1980s and actually decreased about $148 million from 1984 to 1990.

Financing for Wyoming agricultural real estate was dominated during the early part of this period by three sources: the FLB, life insurance companies, and "individuals and others." With a combined outstanding total of $270 million, their market share was 74 percent in 1976 (figure 2). By 1986, the WFLB had moved into first place as a source of farm and ranch real estate loans. The life insurance companies, "individuals and others," and the FLB have declined in market share since 1976. From 1983 to 1990, the FLB's loan volume in Wyoming declined substantially--from $217 million to $90 million.

As the largest source of public credit for agricultural real estate in Wyoming, the WFLB had $209 million in outstanding loans

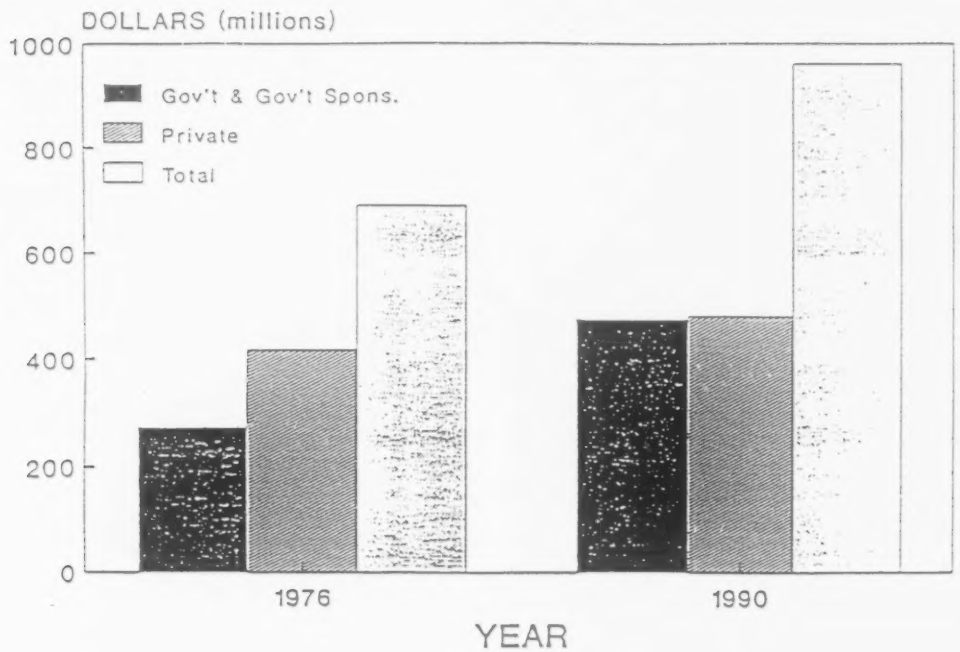



Fig. 1. Total agricultural loans outstanding for private and government-sponsored lenders, Wyoming, January 1, 1976 and 1990

Table 2. Wyoming agricultural real estate loan volume outstanding by source as of January 1, 1976-1990

| Year | FLB | Life ins. | Comm. banks | FmHA | Individuals & others | Wyoming Farm Loan Board Farm | Wyoming Farm Loan Board Irr. | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | $ Million $ | | | | |
| 1976 | 95 | 84 | 12 | 37 | 91 | 25 | 20 | 364 |
| 1977 | 111 | 87 | 14 | 42 | 98 | 30 | 23 | 405 |
| 1978 | 121 | 117 | 16 | 44 | 110 | 34 | 31 | 473 |
| 1979 | 148 | 120 | 14 | 45 | 120 | 34 | 32 | 513 |
| 1980 | 172 | 137 | 14 | 58 | 139 | 37 | 34 | 591 |
| 1981 | 192 | 143 | 15 | 64 | 151 | 42 | 32 | 639 |
| 1982 | 216 | 144 | 13 | 66 | 159 | 53 | 40 | 691 |
| 1983 | 217 | 139 | 14 | 63 | 160 | 75 | 39 | 707 |
| 1984 | 209 | 138 | 16 | 63 | 162 | 99 | 37 | 724 |
| 1985 | 197 | 137 | 23 | 63 | 150 | 119 | 34 | 723 |
| 1986 | 154 | 120 | 29 | 65 | 136 | 159 | 32 | 695 |
| 1987 | 128 | 111 | 28 | 63 | 120 | 196 | 31 | 677 |
| 1988 | 104 | 96 | 26 | 61 | 105 | 210 | 29 | 631 |
| 1989 | 96 | 80 | 25 | 59 | 92 | 210 | 25 | 587 |
| 1990 | 90 | 83 | 28 | 50 | 87 | 209 | 29 | 576 |
| Percentage of total | | | | | | | | |
| 1976 | 26 | 23 | 3 | 10 | 25 | 7 | 6 | 100 |
| 1981 | 30 | 22 | 2 | 10 | 24 | 7 | 5 | 100 |
| 1986 | 22 | 17 | 4 | 9 | 20 | 23 | 5 | 100 |
| 1988 | 17 | 15 | 4 | 10 | 17 | 33 | 4 | 100 |
| 1990 | 15 | 15 | 5 | 9 | 15 | 36 | 5 | 100 |

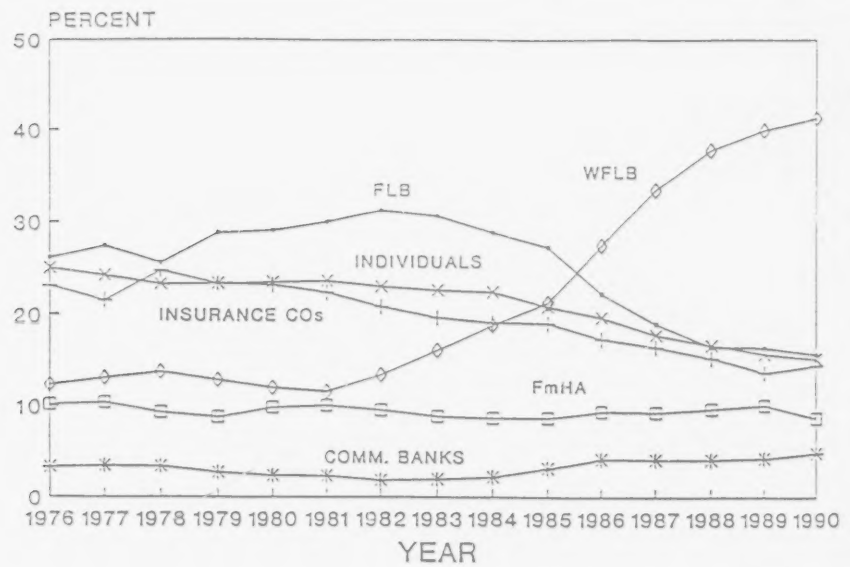



Fig. 2. Trends in market shares of agricultural real estate loan volume by major lenders, January 1, 1976-1990

for real estate and $29 million in irrigation development at the beginning of 1990. The increase for WFLB farm loans in recent years is due primarily to relatively favorable interest rates (8 percent and 9 percent) compared to those offered by other lenders. Interest rates charged by other lenders vary widely but would currently be from 1 to 3 percent above the rates charged by the WFLB. The Wyoming Legislatur has increased its statutory authorization of funds for WFLB real estate loans substantially in recent years from $30 million to $275 million (the present limit stipulated by the Legislature).

Despite the statutory limitation, the WFLB may remain the largest government credit program in Wyoming agricultural real estate in the near future. The FmHA maintained its farm ownership lending activity from 1983 to 1988 in Wyoming at about $60-65 million annually, but has since declined to $50 million as of January 1, 1990 (table 2).

Non-Real Estate Loans

Major sources of non-real estate loans for Wyoming agriculture are commercial banks, FCS (Production Credit Association), "individuals and others," the FmHA, and to a lesser extent the CCC and loans from other financial institutions (OFI) discounted by the Federal Intermediate Credit Bank (FICB). The estimated volumes for the "individuals

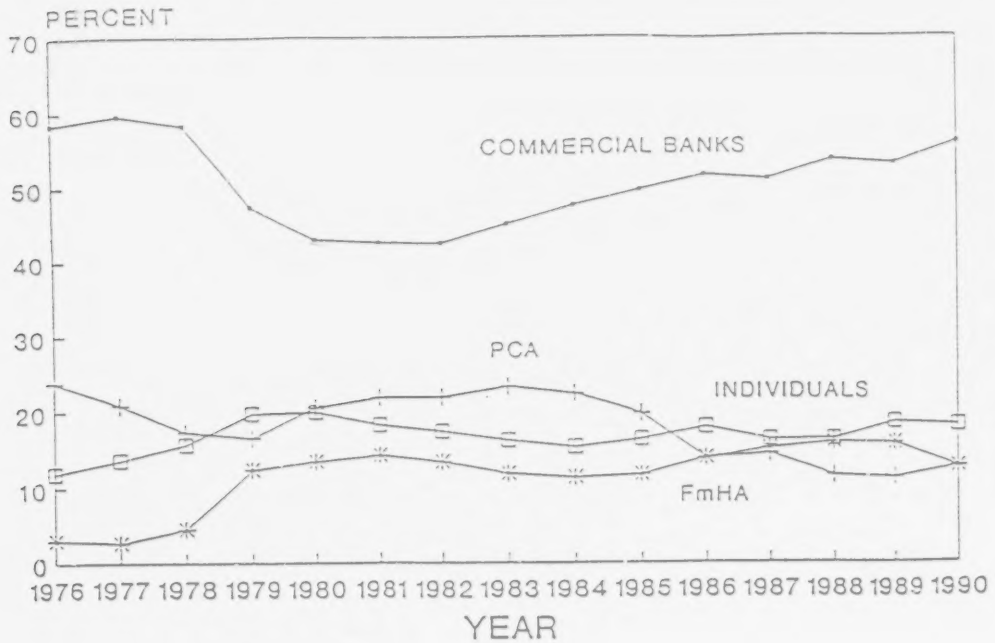



Fig. 3. Trends in market shares of agricultural non-real estate loan volume by major lenders, January 1, 1976-1990

Table 3. Wyoming agricultural non-real estate loan volume outstanding by source as of January 1, 1976-1990

| Year | Commercial banks | PCA | FICB | FmHA | Individuals & others | CCC | Total |
|---|---|---|---|---|---|---|---|
| | | | | $ Million $ | | | |
| 1976 | 191 | 78 | 9 | 10 | 39 | 0 | 327 |
| 1977 | 223 | 78 | 10 | 10 | 51 | 2 | 374 |
| 1978 | 219 | 65 | 10 | 17 | 59 | 6 | 376 |
| 1979 | 206 | 72 | 9 | 54 | 86 | 9 | 436 |
| 1980 | 211 | 101 | 10 | 66 | 98 | 6 | 492 |
| 1981 | 212 | 109 | 9 | 71 | 91 | 7 | 499 |
| 1982 | 225 | 116 | 15 | 71 | 92 | 11 | 521 |
| 1983 | 254 | 131 | 9 | 67 | 91 | 12 | 564 |
| 1984 | 272 | 128 | 8 | 65 | 88 | 12 | 573 |
| 1985 | 278 | 111 | 5 | 66 | 92 | 11 | 563 |
| 1986 | 252 | 68 | 2 | 68 | 88 | 13 | 491 |
| 1987 | 222 | 63 | 1 | 66 | 71 | 14 | 437 |
| 1988 | 222 | 48 | 0 | 66 | 68 | 12 | 416 |
| 1989 | 211 | 45 | 0 | 63 | 74 | 6 | 399 |
| 1990 | 215 | 49 | 0 | 49 | 70 | 3 | 386 |
| Percentage of Total | | | | | | | |
| 1976 | 58 | 24 | 3 | 3 | 12 | -- | 100 |
| 1981 | 43 | 22 | 2 | 14 | 18 | 1 | 100 |
| 1986 | 51 | 14 | 0 | 14 | 18 | 3 | 100 |
| 1988 | 53 | 12 | 0 | 16 | 16 | 3 | 100 |
| 1990 | 55 | 13 | 0 | 13 | 18 | 1 | 100 |

and others" category are mainly merchant and dealer credit and loans between individuals.

Non-real estate lending in Wyoming agriculture is dominated by commercial banks with $215 million outstanding (55 percent) on January 1, 1990 (table 3). Traditionally the second largest lender, the Wyoming PCA (now PCA of the Midlands) had $49 million in loans outstanding on January 1, 1990, a sharp decrease from its high of $131 million in 1983.

Both institutions experienced steady growth in loan volume between 1976 and the early 1980s. The commercial banks' market share decreased from 58 percent in 1976 to 43 percent in 1981, but increased to 55 percent by January 1, 1990 (figure 3). The PCA had a market share of 24 percent in 1976, which decreased to 13 percent in 1990 with a sharp decline in the last seven years (figure 3). There were significant increases in outstanding loans from the FmHA (primarily Economic Emergency and Emergency Loans)

and "individuals and others" between 1976 and 1979. Over the 12-year period from 1976 to 1988, volume outstanding increased by more than a factor of six for the FmHA ($10 million to $66 million). Since then, non-real estate FmHA loans outstanding have declined to $49 million.

Also, the "individual and others" category more than doubled from 1976 to 1980 but declined to $70 million by January 1, 1990. Lastly, the U.S. government's CCC loan program grew from essentially zero in 1976 to a high of $14 million in 1987, and has since declined to $3 million on January 1, 1990. The CCC has provided a very small part of non-real estate loans in Wyoming (1 to 3 percent). CCC loans are made in connection with price support programs of the U.S. government. They are non-recourse loans, completely different from conventional non-real estate loans.

The largest public credit program for non-real estate lending in Wyoming agriculture is currently the FmHA. As noted earlier, its rapid expansion from less than 5 percent to more than 14 percent of market share between 1977 and 1980 was primarily due to growth in the Emergency and Economic Emergency Loan Programs. The declining outstanding volume since 1980 reflects the federal government's commitment to reduction in credit from federal agencies. The FmHA has shifted toward its guaranteed loan program, whereby FmHA guarantees up to 90 percent of the principal on qualified loans by approved lenders, mainly commercial banks.

General Observations

The rapid expansion of farm and ranch real estate loans (farm and irrigation) by the WFLB from $74 million on January 1, 1981 to $238 million on January 1, 1990 raises questions as to what the state's role should be in providing financing. During this nine-year period, the WFLB market share rose from 12 percent to about 41 percent. The state's increased share of loan volume came because of its relatively low-cost loans (8 percent and 9 percent) and because some other lenders were pulling back at the time. As the WFLB approaches its current statutory authorization of $275 million, two related issues arise: (1) competition with private lending institutions, and (2) the optimum role for the state.

As pointed out earlier, the FmHA is moving away from direct loans to guaranteed loans and will likely continue to emphasize guaranteed loans to a greater extent. While there are some problems with this program, many lenders who have received approved lender status to handle FmHA guaranteed loans believe that it is working reasonably well.

The FCS market share of agricultural loans has declined substantially in Wyoming, as in other states, in the last five to six years. The system has established a differential interest rate structure, providing for lower rate loans to lower risk borrowers in an effort to retain some of the stronger borrowers. As

the FCS's reserves are restored and the higher cost bonds in the system's bond portfolio retired, the FCS has been able to reduce borrowers' interest rates to a level more in line with current major money market interest rates. As a result, the system can once again become a strong competitive source of loans for farmers and ranchers.

Commercial banks have traditionally been very important sources of non-real estate loans in agriculture and will likely continue to provide about half of the non-real estate loans. They may become more important in the real estate loan area as a secondary market develops for agricultural mortgages (Farmer MAC program) as authorized by the Agriculture Credit Act of 1987. However, as of this date, there is some question as to how soon the Farmer MAC program will be a significant source of farm and real estate credit. Recent changes in banking regulations and the current merger and combination of independent banks with larger banking organizations will affect the flow of funds into and out of agriculture. There has been a decline in the number of small, independent banks in Wyoming as a result of mergers and acquisitions by bank holding companies.

The number of banks in Wyoming declined from a high of 115 at the end of 1984 to 71 as of December 1990. During the period of 1984 to 1988, most of the decline in numbers was due to bank failure; in the 1988-90 period the decline was virtually all due to bank mergers.

Mergers have taken place rapidly since 1987 when the Wyoming Legislature passed legislation permitting out-of-state bank holding companies to acquire in-state banks. This relaxation of barriers to geographic expansion has occurred in other states as well, and it is estimated that by 1992 most states will allow some form of interstate banking.

It is likely that this structural change in the banking industry will continue reducing further the number of small independent banks in the state. With larger banking firms resulting from mergers, there may be greater efficiencies in bookkeeping and related activities. The advantage of having greater resources to draw on in order to meet large loan demands and in some cases increased competition may also result. On the other hand, an out-of-state holding company may not always put as high a priority on meeting local demands as a local independent bank.

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# Change and Stability in Wyoming Farm Families

The Wyoming farm[1] family, like the rural family nationally, has changed over the past few decades. Some of these changes reflect the realities of farm economics and some are a consequence of increased energy extraction in Wyoming's recent history. The trend toward smaller families, changes in women's roles, and increases in educational attainment that are occurring across the nation are having an effect on Wyoming's farm families as well. It seems certain that the farm family in Wyoming is becoming less distinct in terms of basic sociological features, with fewer and fewer differences to be found between it and rural non-farm and urban families.

### In What Direction is the Wyoming Farm Family Going?

Is the rural household getting older? Are children rejecting their parents' livelihood in favor of non-farm employment? Are farmers themselves working off the farm in greater numbers than before? Are corporate farms replacing the family farm? Are farms getting larger and larger, and are they fewer in number? Did the energy boom of the 1970s significantly change the situation of the farm and ranch family?

Tentative answers to these and other questions are offered in this paper. Relying on the Wyoming volume of the decennial U.S. Census of the Population and the Census of Agriculture for Wyoming, we find that Wyoming farm and ranch families have changed in expected and predictable ways.

These data leave much to be desired by the social scientist who seeks unequivocal answers. Often enumeration categories are different from one census to another. Measures change across censuses, and it is not possible to determine what is causing some of the trends revealed in the data. Until a comprehensive survey of Wyoming farm families is undertaken, however, these are the best data we have to work with.

This paper presents data from the 1950,1960,1970, and 1980 Census of the U.S. Population and the most recent Agricultural Censuses for Wyoming (1974 to 1987), conducted approximately every five years. These data are state and county specific, but we have chosen to look only at the state as a whole.

### Wyoming Farm Families and National Trends

The people of Wyoming have higher educational attainment than the nation as a whole. This is true for Wyoming farm families as well, and accounts for some of the differences found in comparisons of Wyoming and the nation. Adults in Wyoming farm families (over 25 years of age) average 12.6 years of schooling, the same as rural non-farm families and only .2 years less than urban adults. This exceeds the national average by about .5 years.

Are farm families larger than other families? Yes, but not by much. Nationally family size has been decreasing, and this is true in Wyoming as well. In 1960 the

[1]The term "farm" could as easily be, for Wyoming, "farm and ranch." We have chosen, however, to use the single term as found in the censuses.

average number of persons per farm family was 3.91. It was 3.64 in 1970 and 3.27 in 1980. The comparable figures for Wyoming urban families are 3.58, 3.49 and 3.19. Figures for 1990 are expected to be lower still.

The decline in family size reflects a downward shift in fertility. The fertility rate (i.e the number of children born to women who have completed their fertility) of women in farm families is only slightly higher than for urban women: 2.957 children born per 1000 women, compared to 2.787 for urban women. This is the lowest fertility rate for both farm and urban women since 1950.

The same trends hold for households which may or may not be family households. Farm household size has steadily decreased, from 3.67 persons in 1950 to 3.01 persons in 1980. The same figures for urban households are 3.09 persons in 1950 and 2.65 persons in 1980. It is likely this decline for urban households--but not for farm households--reflects the influx of young single males into Wyoming's energy extraction industries during the 1970s.

It is often assumed that the average age of persons on farms is increasing, and this is often a sign that farming is not an attractive economic activity for younger persons. While the older farmers stay on, their children opt for another line of work, thus the average age of people living on farms increases. With the aging of the "baby boom" generation the average age of Americans has been going up. The increasing average age of persons on farms in Wyoming can be accounted for almost entirely in terms of this national trend.

The average age of males on Wyoming farms was 32.6 in 1980, up from 31.5 in 1970, 29.1 in 1960 and 28.7 in 1950. Females have caught up with the males, in terms of their average age, since 1950. In 1950 they averaged 25.2 years, while in 1980 their average age was 32.4. That the average age of urban males in Wyoming is about six years less than that of farm males, and the average age of urban females is about four and a half years less than farm females is most likely the consequence of the energy boom which brought young adults to Wyoming's towns and cities.

A better way to show that farming is not becoming an activity practiced only for the elderly is to look at the median age of heads of farm households. In 1964 this was 50.4 years. It has remained remarkably constant and in 1987 had inched up to only 52 years of age.

### Changes in Wyoming Farms

Are farms and ranches in Wyoming getting larger? Are corporations taking them over, with a resulting decline in family farming and ranching? Are farmers and ranchers relying increasingly on income outside the agricultural operation to support themselves and their families?

Since 1950 the number of farms and ranches has decreased by more than a quarter, from 12,614 to 9203 in 1987, the date of the last Agricultural Census. The number was lowest in 1978, however, when the number dipped to 8018, and has been climbing since then. This trend is reflected in the average size of Wyoming farms and ranches.

Between 1950 and 1978 the size of operations increased, from an average of 2729 acres to an average of 4182 acres. Since then there has been some decline in the average size of farms and ranches, down 9.6 percent between 1978 and 1982 and down another 3.5 percent by 1987.

Table 1 shows the changes in types of farm and ranch ownership for three time periods: 1978,1982 and 1987. In each category the number of farms has been

Table 1. Farm and Ranch Ownership and Percentage Change, 1978, 1982 and 1987

| Type of Farm | Number in 1978 | Number in 1982 | % Change 1978-82 | Number in 1987 | % Change 1982-87 |
|---|---|---|---|---|---|
| Individual Family Farm | 6344 | 6976 | +10.0 | 7289 | +4.4 |
| Partnership | 829 | 907 | +9.4 | 937 | +3.3 |
| Corporation | 759 | 826 | +8.8 | 858 | +3.9 |
| Other | 108 | 152 | +40.7 | 126 | -17.1 |

increasing, with the number of individually owned farms and ranches increasing slightly faster than partnerships and corporately owned operations.

Although the number of farms have increased in Wyoming since 1978, there has been a gradual shift away from farming as the primary reported occupation. For example, in 1972 almost three out of four (72.7%) of farm households reported farming as the primary occupation of the head of household. By 1987 this percentage had dropped to 64.7 percent.

Related to the shift in occupational reporting are changes in the number of heads of households reporting reliance upon off-farm employment since 1974. In 1974 less than half of all heads of households (47.3%)

TABLE 2: Off-farm Employment For Heads of Household, 1974-1987

| Year | No Off-Farm Days | | Some Off-Farm Days | | 200+ Days | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Number | Percent |
| 1974 | 3117 | 52.7 | 2799 | 47.3 | 1489 | 53.2 |
| 1978 | 3870 | 50.4 | 3809 | 49.6 | 2037 | 53.5 |
| 1982 | 3793 | 47.0 | 4271 | 53.0 | 2500 | 58.5 |
| 1987 | 3932 | 45.7 | 4674 | 54.3 | 2640 | 56.5 |

Data reported here omits nonrespondents. The percentage reported under category of 200+ days refers to the percentage of heads of households who, among all heads of households who had off-farm employment during the repective year, worked 200 or more days off the farm

reported working off-farm, and of these 53.2 percent worked two hundred or more days off-farm. By 1987, however, 54.3 percent reported off-farm employment, and of these over 56 percent reported working two hundred or more days off-farm. Both primary occupation data and days worked off-farm emphasize that over the past thirteen years Wyoming agriculturalists were somewhat less likely to be full-time farmers and were devoting a greater percentage of their work time to off-farm employment.

### Farm Families--How Different Are They?

The most general conclusion that can be reached from this discussion is that there is decreasing difference between farm families and families in urban areas of Wyoming. This convergence is seen in term of the higher educational attainment, lower fertility, smaller family size, age stability, and reliance on off-farm employment found in farm families during the last two decades.

Farms in Wyoming are not being transformed into corporate holdings on a large scale, nor is the farm being abandoned or rejected by young families. Farming in Wyoming, unlike national trends toward agribusiness, remains overwhelmingly a family enterprise, albeit requiring significant support through off-farm employment.

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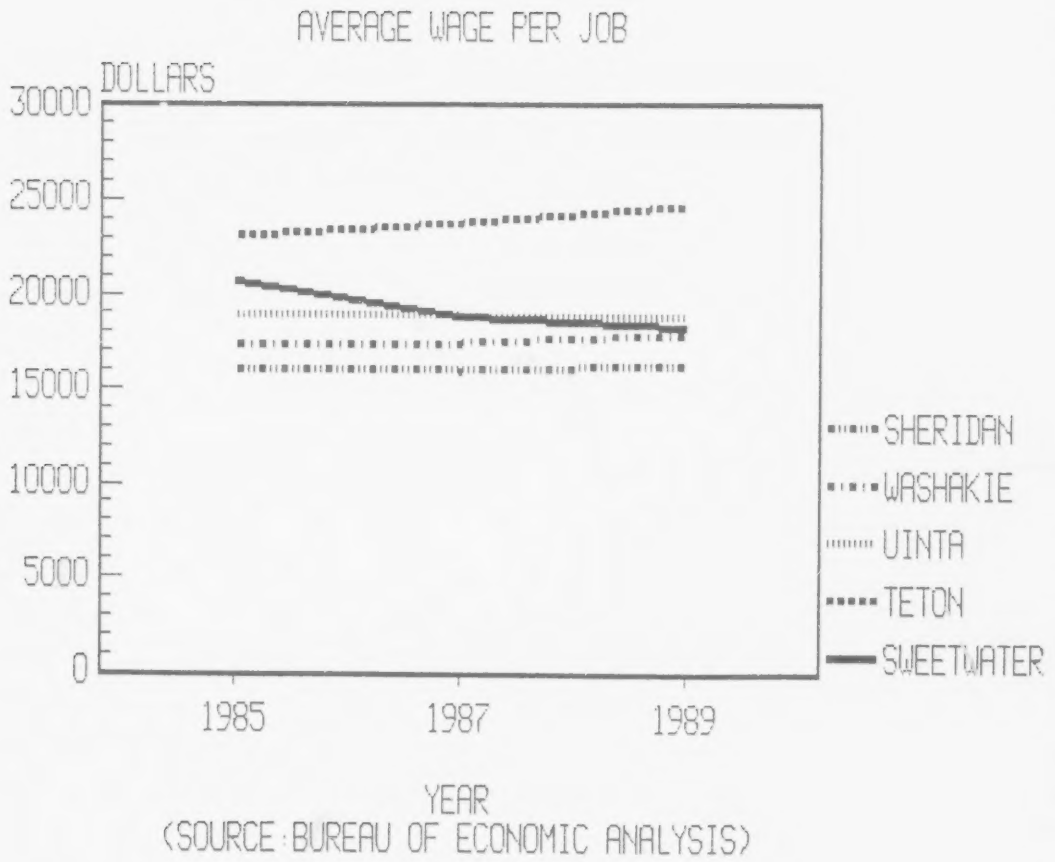
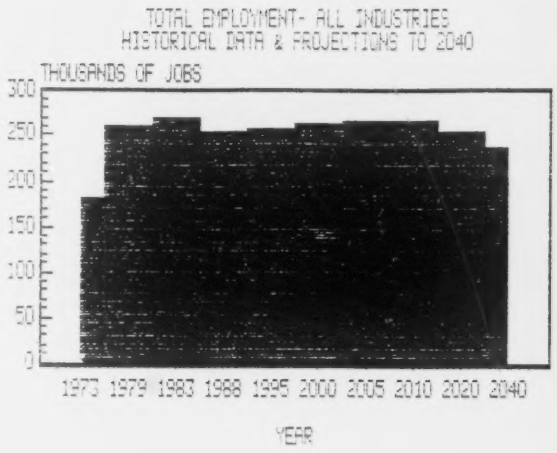
# Economic Changes

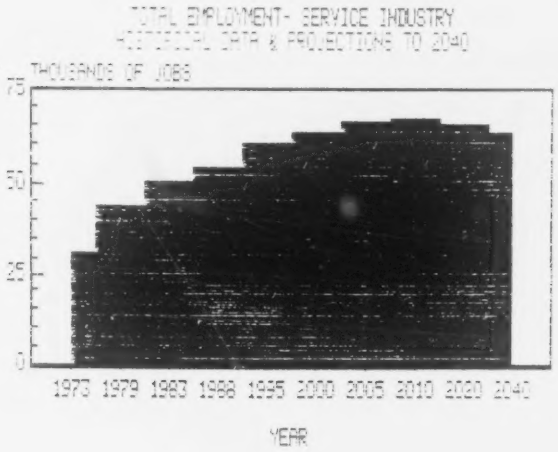


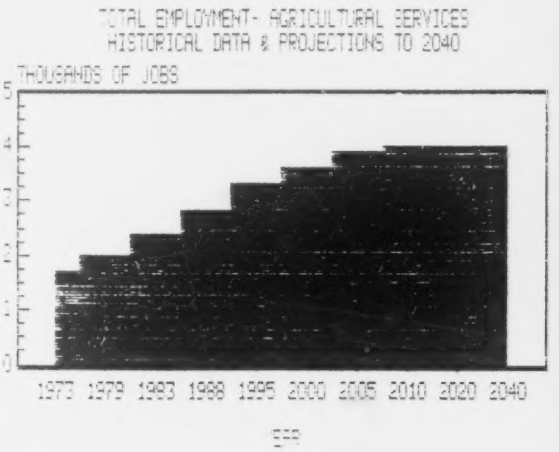

(SOURCE: BUREAU OF ECONOMIC ANALYSIS)

## ECONOMIC CHANGES

The Bureau of Economic Analysis, a part of the United States Department of Commerce, recently released some historical data as well as projections through the year 2040. Data included information on per capita personal income, population, income by industry, and employment by industry. The graphs to the right and below give the total employment for four industries in Wyoming; Construction,the Service Industry, Agricultural Services and Mining. Those interested in the projections offered in the BEA release can contact the Survey Research Center at 307-766-2931.

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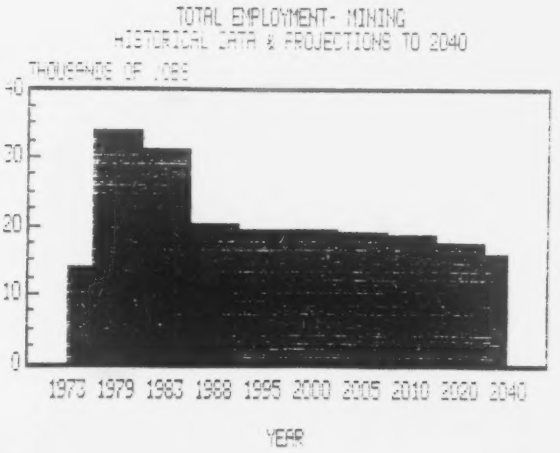
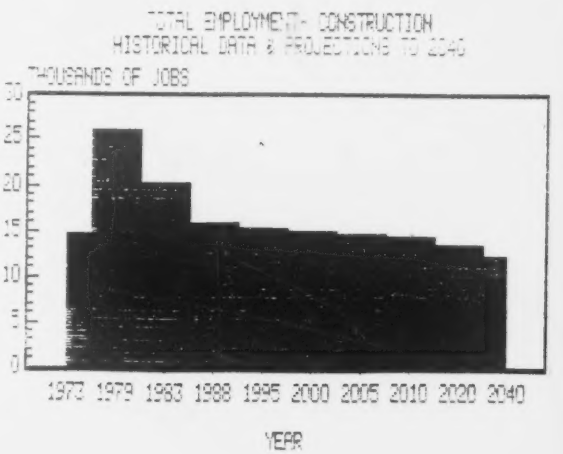
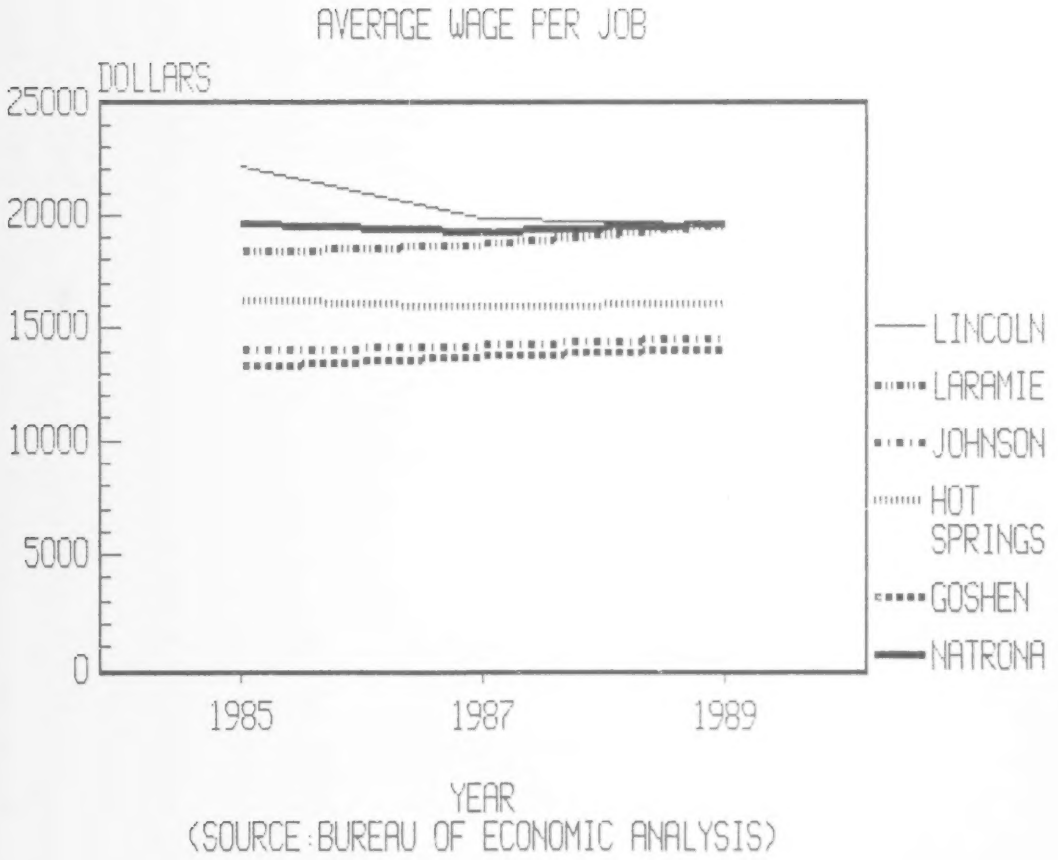
HISTORICAL DATA & PROJECTIONS TO 2040
THOUSANDS OF JOBS
1973 1979 1983 1988 1995 2000 2005 2010 2020 2040
YEAR






(SOURCE: BUREAU OF ECONOMIC ANALYSIS)

Table 1: Agriculture[1]

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Timber Cut in Wyoming National Forests (MBF) | 28080. | 5860. | 39416. | 54863. | 23488. | 6218. | 37522. | 46222. | 26418. | 65442. | 31445. | 43993 |
| Price Indices[2] (1967=100) | | | | | | | | | | | | |
| 2. Wyoming Crops, Prices Received-Latest | 218. | 244. | 323. | 322. | 349. | 363. | 313. | 336. | 337. | 347. | 263. | 271. |
| 3. Wyoming Crops, Prices Received-Average | 217. | 234. | 302. | 323. | 344. | 362. | 336. | 329. | 327. | 346. | 313. | 273. |
| 4. U.S. Crops, Prices Received-Latest | 212. | 249. | 260. | 262. | 266. | 275. | 243. | 245. | 258. | 301. | 236. | 234. |
| 5. U.S. Crops, Prices Received-Average | 214. | 230. | 262. | 260. | 264. | 273. | 251. | 245. | 263. | 271. | 243. | 234. |
| 6. Wyoming, All Commodities, Prices Received-Latest | 301. | 260. | 313. | 292. | 324. | 301. | 310. | 298. | 322. | 313. | 301. | 291. |
| 7. Wyoming, All Commodities, Prices Received-Average | 294. | 280. | 295. | 300. | 311. | 308. | 311. | 299. | 314. | 315. | 303. | 295. |
| 8. U.S. All Commodities, Prices Received-Latest | 237. | 253. | 264. | 265. | 274. | 270. | 262. | 272. | 281. | 277. | 271. | 264. |
| 9. U.S., All Commodities, Prices Received-Average | 238. | 246. | 263. | 263. | 275. | 271. | 265. | 269. | 278. | 278. | 274. | 266. |
| 10. Wyoming Livestock, Prices Received-Latest | 325. | 265. | 310. | 283. | 316. | 283. | 308. | 286. | 318. | 303. | 313. | 297. |
| 11. Wyoming Livestock, Prices Received-Average | 317. | 294. | 293. | 293. | 309. | 292. | 300. | 389. | 315. | 306. | 300. | 301. |
| 12. U.S. Livestock, Prices Received-Latest | 260. | 257. | 268. | 269. | 281. | 264. | 279. | 297. | 302. | 250. | 303. | 291. |
| 13. U.S. Livestock, Prices Received-Average | 259. | 259. | 264. | 267. | 284. | 269. | 278. | 290. | 293. | 282. | 302. | 294. |
| 14. Prices Paid by U.S. Farmers-Average | 339. | 348. | 352. | 354. | 359. | 361. | 361. | 365. | 281. | 372. | 380. | 380. |

[1] First time readers of WOU should refer to the "Format" page (in back) for an explanation of abbreviations and table formats.
[2] The index for the last month (latest) of each quarter, along with the average of the three monthly indices of each quarter.

Sources: Series 1: United States Forest Service. "Timber Cut and Sold, Convertible Products." Region 2 and 4 reports published quarterly.
Series 2-15: Wyoming Crop and Livestock Reporting Service. Bi-weekly Ag Statistics.

Table 2: Banking and Finance

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total Bank Loans and Leases Financing Receivables (T$) | 1733754. | 1787542. | 1777474. | 1758410. | 1740029. | 1793438. | 1787592. | 1782338. | 1848557. | 1944633. | 1990127. | 2069101 |
| 2. Total Bank Deposits (T$) | 3671572. | 3705311. | 3712403. | 3753325. | 3623495. | 3621158. | 3633097. | 3838374. | 3768344. | 3864849. | 4018391. | 4129695. |
| 3. Total Non-Interest-Bearing Deposits (T$) | 531243. | 564608. | 572367. | 577610. | 525702. | 549281. | 559276. | 648397. | 542168. | 555941. | 585554. | 625165. |
| 4. Savings and Loan Mortgage Loans (T$)[1] | 744492. | 740954. | 726300. | 711602. | 719240. | 696415. | 617166. | 636718. | 431583. | 418552. | 354447. | INA |
| 5. Savings and Loan Deposits (T$) | 1119558. | 1107268. | 1107961. | 1070072. | 1032814. | 988180. | 952120. | 962666. | 945644. | 908386. | 767458. | INA |
| 6. Prime Interest Rate[2] | 8.50 | 9.00 | 10.00 | 10.50 | 11.50 | 11.07 | 10.50 | 10.50 | 10.0 | 10.0 | 10.0 | 10.0 |

[1]Only members of the Federal Home Loan Bank Board are included. Indicates amount at the end of the quarter.
[2]Prime rate charged by banks on short-term business loans. Rate is for last month of the quarter.

Sources: Series 1-3: Office of the State Examiner of Wyoming, Abstract Report of State and National Banks in Wyoming, Published Quarterly.
Series 4 and 5: Federal Home Loan Bank of Seattle, Monthly Report. Comparative statistical analysis of member institutions.
Series 6: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 3: Business Conditions

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Domestic Corporations | 300. | 298. | 246. | 221. | 284. | 302. | 236. | 276. | 316. | 355. | 353. | 365. |
| 2. New Foreign Corporations | 208. | 196. | 208. | 232. | 210. | 249. | 196. | 208. | 196. | 262. | 214. | 231. |
| 3. Total New Corporations | 508. | 494. | 454. | 453. | 484. | 551. | 432. | 484. | 512. | 617. | 567. | 596. |
| 4. Business Failures | 75. | 52. | 34. | 32. | 31. | 30. | 24. | 25. | 31. | 28. | 19. | INA |
| 5. Value of Business Failures ($) | 11499022. | 3906790. | 28339514. | 36551338. | 3120102. | 7852143. | 3591064. | 1998791. | 2914000. | 5578685. | 2072828. | INA |
| 6. Personal Bankruptcies | 271. | 351. | 306. | 306. | 274. | 336. | 287. | 285. | 237. | 362. | 252. | INA |

Sources: Series 1-3: Secretary of State. New and Foreign Corporations. Monthly report.
Series 4-6: Cheyenne Credit Bureau. Wyoming bankruptcy cases, business failures, and value of failures. Weekly publication.

Table 4: Construction

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Residential Dwelling Units | 304. | 449. | 359. | 291. | 233. | 289. | 401. | 264. | 394. | 317. | 614. | 463. |
| 2. Value of Residential Dwellings Constructed (M$) | 23.5 | 37.3 | 31.3 | 22.6 | 18.2 | 25.0 | 34.7 | 23.8 | 34.7 | 31.3 | 54.8 | 43.9 |
| 3. Value of Nonresidential Construction (M$) | 4.2 | 35.2 | 6.9 | 10.2 | 10.9 | 17.1 | 23.6 | 34.6 | 15.5 | 39.4 | 30.2 | 21.0 |
| 4. Building Permits Issued in Selected Wyoming Citie | 1489. | 2763. | 2220. | 2082. | 1578. | 2806. | 2663. | 1996. | 1695. | 2634. | 2558. | 1885. |
| 5. Value of Authorized Construction (T$) | 15559. | 25330. | 21878. | 18071. | 8866. | 24528. | 22760. | 27343. | 16011. | 37542. | 29331. | 20714. |
| 6. Mortgage Interest Rate[1] | 8.77 | 8.72 | 8.90 | 9.03 | 9.66 | 10.09 | 9.87 | 9.70 | 9.70 | 9.80 | 9.60 | 9.61 |

[1]Conventional first mortgage for new home purchase. U. S. average for last month of quarter.

Sources: Series 1-3: F.W. Dodge Division of McGraw-Hill. "Dodge Local Construction Potentials." Published monthly.
Series 4-5: Survey Research Center. "Local Construction Reports." Survey of authorized construction in selected cities conducted monthly.
Series 6: U. S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 5: Consumers

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Truck Registrations | 2867. | 3508. | 3203. | 3227. | 3086. | 3734. | 3775. | 3344. | 3474. | 3697. | 2986. | 2989. |
| 2. New Car Registrations | 2736. | 3147. | 2969. | 2849. | 2538. | 3341. | 3412. | 2409. | 2352. | 2607. | 2438. | 2149. |
| 3. Wyoming Personal Income (M$) | 6390. | 6638. | 6624. | 6665. | 6770. | 6830. | 6903. | 7034. | 7144. | 7223. | 7345. | INA |
| 4. U.S. Disposable Income (B$) | 3376. | 3422. | 3512. | 3587. | 3690. | 3748. | 3807. | 3871. | 3888. | 3926. | 3969. | 4001. |
| 5. U.S. Personal Income (M$) | 3940129. | 4022465. | 4095777. | 4176250. | 4287087. | 4347177. | 4385348. | 4452904. | 4546227. | 4605604. | 4661995. | INA |
| 6. Latest U.S. Consumer Price Index (1982-1984=100)[1] | 115.1 | 116.7 | 118.5 | 119.2 | 120.8 | 122.8 | 123.6 | 124.6 | 127.1 | 128.3 | 131.1 | 132.2 |
| 7. Quarter's Average U.S. CPI | 114.8 | 116.7 | 117.8 | 119.5 | 120.2 | 122.4 | 123.3 | 124.4 | 127.5 | 127.7 | 129.9 | 132.2 |
| 8. Liquor Sales (T$) | 5679. | 6714. | 7041. | 8368. | 5530. | 6747. | 7269. | 7746. | 5729. | 7036. | 7916. | 8643. |

[1]Number shown is for the last month of the quarter. CPI shown is the index for wage earners and clerical workers.

[2]Beginning January 1987, the consumer price index, previously expressed on a base of 1967=100, has been rebased to 1982-84=100. Selection of the 1982-84 period was made to coincide with the updated expenditure weights, which are based upon data tabulated from the Consumer Expenditure Surveys for 1982, 1983, and 1984. Historical data on the new base or additional information regarding these changes is available from the Bureau of Labor Statistics, Washington, D.C. 20212.

Sources: Series 1-2: R.L. Polk and Company Motor Statistical Division. "National New Vehicle Registration Service." Published monthly.
Series 3,4: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published quarterly.
Series 5,6,7: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.
Series 8: Wyoming Liquor Commission. Sales data are reported to SRC.

Table 6: Employment and Labor[1]

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Civilian Labor Force | 228734. | 232589. | 235250. | 231426. | 235106. | 238973. | 242749. | 229173. | 234724. | 245354. | 245287. | 243179. |
| 2. Employment | 209923. | 219454. | 222072. | 216552. | 217688. | 224543. | 228035. | 225734. | 223852. | 233190. | 235389. | 230014. |
| 3. Unemployment | 18811. | 13135. | 13178. | 14874. | 17418. | 14431. | 14714. | 13438. | 10871. | 12164. | 9899. | 13166. |
| 4. Unemployment rate | 8.2 | 5.6 | 5.6 | 6.4 | 7.4 | 6.0 | 6.1 | 5.6 | 4.6 | 5.0 | 4.0 | 5.4 |
| 5. Initial Claims Filed | 10949. | 6888. | 5376. | 9704. | 10334. | 6508. | 4621. | 8659. | 9220. | 5673. | 4682. | 8791. |
| 6. Miners' Average Weekly Hours | 42.9 | 43.6 | 43.4 | 42.7 | 46.3 | 34.8 | 45.2 | 45.2 | 43.8 | 33.9 | 46.2 | 46.5 |
| 7. Miners' Average Weekly Pay ($) | 625.72 | 533.42 | 619.70 | 627.33 | 678.68 | 651.62 | 656.60 | 661.19 | 660.70 | 684.52 | 685.37 | 703.83 |
| 8. Miners' Average Hourly Wage ($) | 14.60 | 12.23 | 14.29 | 14.68 | 14.67 | 18.73 | 14.54 | 14.63 | 15.08 | 20.19 | 14.83 | 15.14 |

[1]The most recent year's data are preliminary.

Sources: Series 1-11: Wyoming Employment Security Commission. Labor Force Trends. Published monthly.

Table 7: Energy and Mineral Production

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Wyoming Coal (TST) | 37323. | 39016. | 42883. | 41013. | 41874. | 40469. | 41114. | 41629. | 45139. | 40541. | 47488. | 48131. |
| 2. U.S. Coal (TST) | 231473. | 225968. | 239046. | 227754. | 249267. | 238251. | 236713. | 250209. | 265714. | 249068. | 268296. | 251951. |
| 3. Wyoming Oil (TBPD) | 320. | 317. | 306. | 299. | 302. | 299. | 291. | 294. | 292. | 289. | 284. | 284. |
| 4. U.S. Oil (TBPD) | 8304. | 8216. | 8033. | 7984. | 7753. | 7701. | 7529. | 7560. | 7459. | 7275. | 7150. | 7346. |
| 5. Wyoming Natural Gas (MMCFD)[1] | 1430. | 1339. | 1135. | 1455. | 1953. | 1274. | 1340. | 1820. | 2009. | 1754. | INA | INA |
| 6. U.S. Natural Gas (MMCFD) | 50768. | 46453. | 44547. | 48982. | 51693. | 48980. | 47211. | 49795. | 52982. | 49343.. | 47256. | INA |
| 7. Active Rig Counts in Wyoming-Average | 40. | 33. | 43. | 31. | 20. | 22. | 43. | 50. | 34. | 31. | 44. | 39. |

[1]Beginning with fourth quarter 1986, Wyoming gas includes carbon dioxide production.

Sources: Series 1,2,5, and 6: U. S. Department of Energy. Energy Data Reports. Gas data are from Natural Gasy Monthly, and the Wyoming Oil and Gas Conservation Commission. Coal data are published weekly.
Series 3-4: The Oil and Gas Journal. U.S. and Wyoming Oil Production. Published weekly.
Series 7: Petroleum Information Corporation, Hughes Tool Company. Monthly Average Active Rig Counts in Wyoming.

Table 8: Government

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sales and Use Tax Collections (T$) | 42585. | 42769. | 49721. | 46445. | 41823. | 42966. | 53145. | 54618. | 51699. | 50077. | 61744. | 61387. |
| 2. Violent Crime[1] | 354. | 371. | 431. | 308. | 310. | 278. | 323. | 307. | 301. | 335. | INA | INA |
| 3. Nonviolent Crime[2] | 3713. | 4562. | 4662. | 3917. | 3565. | 4423. | 4704. | 4138. | 3800. | 4432. | INA | INA |
| 4. Stolen Property (T$) | 1770. | 1986. | 2467. | 2272. | 2040. | 2617. | 2200. | 1894. | 2151. | 2269. | INA | INA |
| 5. Stolen Property Recovery Rate | 42.2 | 43.1 | 35.5 | 36.0 | 42.8 | 30.5 | 44.0 | 36.7 | 46.3 | 38.6 | INA | INA |
| 6. Percent of Crimes Cleared[3] | 33.7 | 28.3 | 30.9 | 40.0 | 33.0 | 27.5 | 27.1 | 29.5 | 35.2 | 28.6 | INA | INA |

[1]Murder, negligent homicide, forcible rape, robbery, aggravated assault.

[2]Burglary, larceny, auto theft.

[3]Clearance of a crime indicates resolution of a complaint by arrest or other extraordinary means.

Sources: Series 1: Wyoming Department of Revenue and Taxation, Sales and Use tax Division. "Net Collections by Business Class by County."

Series 2-6: Uniform Crime Reporting Center for Criminal Justice Research, Division of Criminal Identification, Office of the State Attorney General. "Crime in Wyoming." Published quarterly.

Table 9: Tourism

| Calendar Quarter | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Visitors, National Parks and Monuments | | | | | | | | | | | | |
| 1. Yellowstone | 83736. | 649842. | 1268270. | 216076. | 82542. | 720021. | 1724290. | 153523. | 79552. | 761664. | 1857973. | 139998. |
| 2. Grand Teton | 144982. | 624400. | 1083754. | 223562. | 211180. | 665734. | 1361210. | 302539. | 170799. | 680593. | 1544479. | 284906. |
| 3. Devil's Tower | 7121. | 109993. | 222877. | 20702. | 8064. | 120589. | 229668. | 19106. | 8251. | 119264. | 279985. | 20224. |
| 4. Fossil Butte | 286. | 5894. | 13838. | 1195. | 224. | 5565. | 13192. | 1452. | 195. | 6692. | 25244. | 2945. |
| 5. Fort Laramie | 1172. | 24384. | 49631. | 4145. | 1475. | 20488. | 40697. | 3007. | 1505. | 21869. | 41037. | 2845. |
| 6. Big Horn NRA-South[1] | 30045. | 60727. | 58820. | 35558. | 14293. | 47417. | 62160. | 185172. | 15664. | 102821. | 70249. | 29713. |
| Other Tourism Indicators | | | | | | | | | | | | |
| 7. Traffic count (Avg. number of Vehicles/Day) | 88529. | 142830. | 178675. | 118023. | 113409. | 146663. | 184209. | 118130. | 105793. | 159830. | 206100. | 125782. |
| 8. Hotel, Motel, and Camp Sales Tax (T$) | 947. | 1050. | 2106. | 1929. | 950. | 1013. | 1962. | 1951. | 991. | 1135. | 2731. | 2082. |
| 9. Gasoline Sales (TGL) | 62295. | 81811. | 96106. | 70784. | 61807. | 78869. | INA | INA | INA | INA | INA | INA |

[1]Big Horn Canyon N.R.A. is only partially in Wyoming. Only visitation for the Wyoming part is shown.

Sources: Series 1-6: Monthly visitor use reports of the National Park Service.
Series 7: Traffic Survey Unit - Planning Branch, Wyoming State Highway Department. "Selected Recording Stations Traffic Counter Data." Published monthly.
Series 8: Wyoming Department of Revenue and Taxation. "Sales and Use Tax Summary by County by SIC Major and Minor." Reported monthly.
Series 9: Petroleum Association of Wyoming. Monthly Gasoline Gallonage Report.

Table 10: Utilities[1]

| Calendar Quarters | 1/88 | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Residential Electric Connections | 175896. | 176333. | 177122. | 176457. | 175841. | 175589. | 175485. | 176197. | 174439. | 179163. | 176520. | 176434. |
| 2. Residential Electric Consumption (TKWH) | 505669. | 351036. | 301098. | 401776. | 688891. | 348577. | 296588. | 418463. | 488454. | 351960. | 304197. | 440211. |
| 3. Commercial Electric Connections | 33602. | 33722. | 33846. | 33756. | 33928. | 33997. | 34038. | 140722. | 34036. | 34278. | 34370. | 34281. |
| 4. Commercial Electric Consumption (TKWH) | 456190. | 420630. | 425495. | 426766. | 467697. | 414902. | 428705. | 449339. | 457875. | 447084. | 469100. | 469265. |
| 5. Industrial Electric Connections | 2760. | 2748. | 2921. | 2872. | 2972. | 3104. | 3143. | 3084. | 3203. | 3507. | 3535. | 3431. |
| 6. Industrial Electric Consumption (TKWH) | 1788103. | 1815370. | 1720051. | 1847617. | 1812799. | 1923513. | 1790624. | 1968557. | 1990072. | 1919833. | 1796303. | 2131555. |
| 7. Other Connections[2] | 2965. | 3690. | 3899. | 3404. | 3349. | 7440. | 4573. | 4091. | 4675. | 4198. | 4280. | 3908. |
| 8. Other Consumption (TKWH) | 10451. | 24283. | 64994. | 13221. | 9051. | 41364. | 102572. | 59012. | 57146. | 57187. | 94327. | 59782. |
| 9. Residential Natural Gas Connections | 74286. | 73935. | 90673.[3] | 93300. | 100074. | 99535. | 97665. | 90066. | 90456. | 90223. | 89853. | 90327. |
| 10. Residential Natural Gas Consumption (MCF) | 4310738. | 2042533. | 826220.[3] | 2521850. | 5786697. | 2436947. | 871763. | 2454142. | 4537105. | 2321660. | 760692. | 10731338. |
| 11. Commercial Natural Gas Connections | 6643. | 6560. | 8357.[3] | 9398. | 9422. | 9289. | 10514. | 18913. | 19028. | 18910. | 18928. | 18746. |
| 12. Commercial Natural Gas Consumption (MCF) | 1939461. | 957241. | 475106.[3] | 1349515. | 2981071. | 1283967. | 631348. | 1818451. | 3305106. | 1702262. | 614511. | 7950861. |
| 13. Industrial Natural Gas Connections | 88. | 90. | 90. | 78. | 85. | 82. | 80. | 79. | 73. | 73. | 71. | 68. |
| 14. Industrial Natural Gas Consumption (MCF) | 3249154. | 482088. | 2324709. | 2504087. | 3069267. | 1977830. | 2279086. | 2611580. | 3019329. | 2774710. | 1810840. | 3361610. |
| 15. Other Natural Gas Connections | 39. | 36. | 35. | 34. | 36. | 36. | 34. | 33. | 29. | 32. | 38. | 37. |
| 16. Other Natural Gas Consumption (MCF) | 12922. | 1920. | 7488. | 232. | 1216. | 4344. | 10405. | 312 | 138. | 2309. | 1138300.[4] | 1384771. |

[1]Some small utilities do not report, hence the data are slightly less than actual state totals. The data are consistent. The same utilities' reports are included in each figure.

[2]"Other" includes agriculture, municipal, and other public.

[3]Starting with third quarter, 1988, the figures for Residential and Commercial Natural Gas Connections and Residential and Commercial Natural Gas Consumption reflect the merger of Northern Gas Division, Northern Utilities Division, and Northern Mountain Gas Company now doing business as Northern Gas of Wyoming.

[4]Starting with third quarter, 1990, Mountain Fuel Supply included gas transported by their company for another company in the "other" category.

## FORMAT

For data available at least quarterly, the last 12 quarters are printed in **WQU**. In this edition, published series begin with the 1st quarter of 1988, and end with the 4th quarter of 1990. For other data series (primarily annual), the most recent observations, up to 12, are published in **WQU**. Quarters are calendar quarters. For example, the 4th quarter is composed of October, November and December. In the table headings and narratives, a particular quarter will be indicated by notation such as 4/87 (4th quarter, 1987), 1/88 (1st quarter, 1988), and so on.

Beside each data series name is an abbreviation in parenthesis. The abbreviation indicates the units (such as dollars, tons, feet, miles, etc.) of the data. The key to the units abbreviations is below.

Throughout **WQU**, all data are for the State unless otherwise stated. The most recent year's data should be viewed as preliminary, due to revisions. The acronym "INA" signifies that information is not available.

The reader should be attentive to the footnotes at the bottom of pages, particularly those accompanying a data table. The footnotes help the reader to properly interpret the data, and they also indicate when more detailed (by subject or by area) data than that which is shown is available from SRC. A list of sources follows the footnotes.

Key to Units Abbreviations

| | | | | | |
|---|---|---|---|---|---|
| MBF | - | Thousand Board feet | CWT | - | Hundred Weight |
| KWH | - | Kilowatt Hours | ST | - | Short Tons |
| TKWH | - | Thousand Kilowatt Hours | HST | - | Hundreds of Short Tons |
| $ | - | Dollars | TST | - | Thousands of Short Tons |
| H$ | - | Hundreds of Dollars | $/ST | - | Dollars Per Short Tons |
| T$ | - | Thousands of Dollars | HBBL | - | Hundreds of Barrels |
| M$ | - | Millions of Dollars | TBPD | - | Thousands of Barrels Per Day |
| B$ | - | Billions of Dollars | MCF | - | Thousand of Cubic Feet |
| GL | - | Gallons | HMCF | - | Hundreds of MCF Per Day |
| TGL | - | Thousands of Gallons | MMCFD | - | Million Cubic Feet Per Day |

Feature Articles

--Agricultural Loan Volume and Market Share Trends in Wyoming, 1976-1990

Andrew Vanvig
Department of Agricultural Economics
University of Wyoming

--Change and Stability in Wyoming Farm Families

Audie Blevins
Garth Massey
Department of Sociology
University of Wyoming

Subscriptions

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The Survey Research Center

The Survey Research Center was established in the Summer of 1989. In addition to maintaining the data base used to publish the Update, the Center has the facilities, equipment, personnel and expertise to collect, compute and analyze survey data for both the public and private sector. The Center also serves as the Campus Affiliate Center of the State Data Center in Cheyenne and has information from the United States Census Bureau available.

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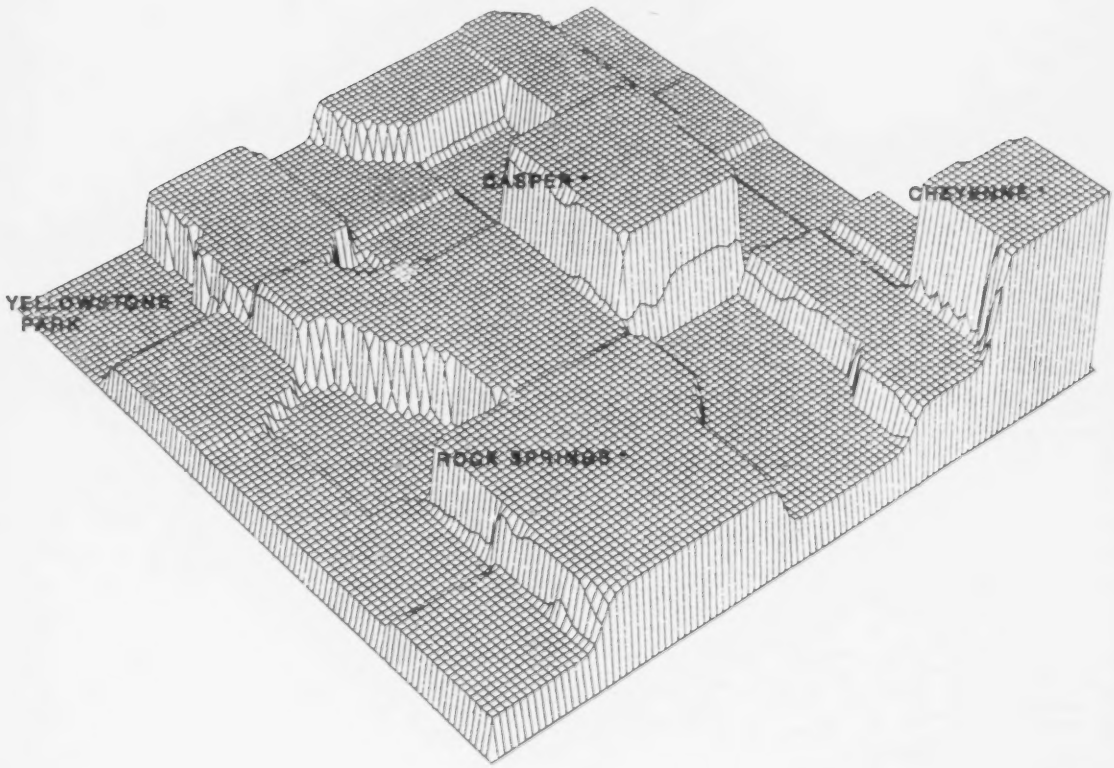
# WYOMING QUARTERLY UPDATE

SPRING 1991

Vol. 10, No. 3

Total Households, 1990 Census

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UNIVERSITY OF WYOMING

## Wyoming Quarterly Update

Wyoming Quarterly Update (WQU) represents the efforts of the Survey Research Center at the University of Wyoming to provide improved data access services. The data presented in WQU are assembled from secondary sources, such as government agencies and private industry. The staff of SRC greatly appreciates the ongoing, helpful cooperation of each of the data sources.

WQU provides current indicators and timely, easily accessible data. Most of the data published in WQU are updated quarterly with the most current numbers. The complete data sets from which WQU originates are maintained, together with documentation by SRC. Readers are encouraged to contact the Center to find out how to gain access to data which do not appear in the WQU. Many data series, such as gasoline sales and taxation data, span more than 30 years. Numerous other series cover 20 years or more.

The cover of each edition features a contour map illustrating the geographic distribution of a particular variable. This edition presents data from the 1990 Census on the number of households for each county. Households include all the persons who occupy a housing unit. Persons not living in households are classified as living in group quarters. As with most 1990 Census material released so far, counts are subject to possible correction for undercount or overcount. Corrected counts will be released no later than July 15, 1991.

| County | # of Households | County | # of Households | County | # of Households |
|---|---|---|---|---|---|
| Albany | 11,957 | Hot Springs | 1,943 | Sheridan | 9,426 |
| Big Horn | 3,905 | Johnson | 2,397 | Sublette | 1,834 |
| Campbell | 9,968 | Laramie | 28,092 | Sweetwater | 13,616 |
| Carbon | 6,001 | Lincoln | 4,137 | Teton | 4,568 |
| Converse | 4,046 | Natrona | 23,837 | Uinta | 5,885 |
| Crook | 1,892 | Niobrara | 1,032 | Washakie | 3,156 |
| Fremont | 12,002 | Park | 8,757 | Weston | 2,419 |
| Goshen | 4,790 | Platte | 3,179 | Yellowstone | 0 |

First-time readers of WQU should refer to the "format" explanations at the end of the magazine for keys on how best to use and interpret data presented in this publication.

For additional information, contact:

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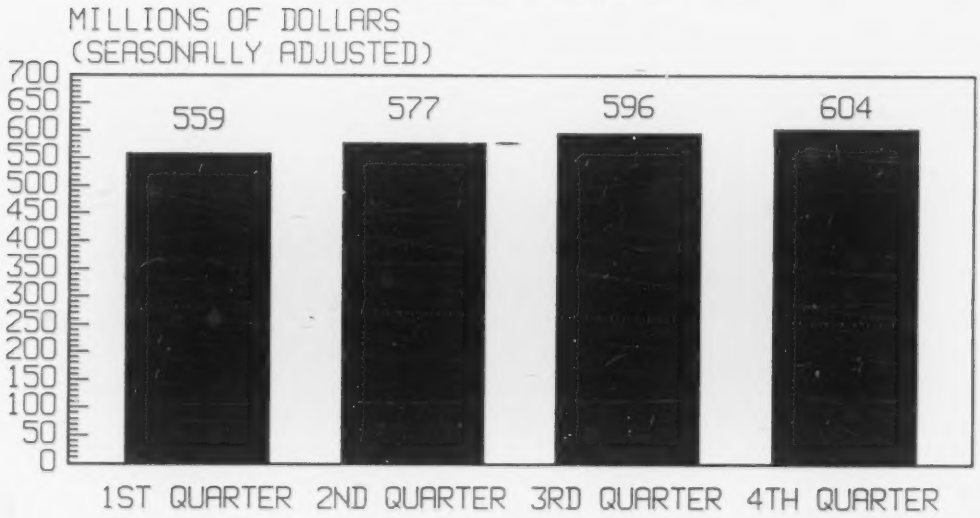
***Wyoming Quarterly Update*** is published four times per year in fall, winter, spring, and summer editions.



The articles appearing in this publication represent the opinions of the authors and do not necessarily reflect the views of the State of Wyoming or the University of Wyoming or their respective executive officers. Duplication or quotation of material in this publication is welcomed, but it is requested that **WQU**, the Survey Research Center, University of Wyoming, be credited.

QUARTERLY WAGES AND SALARIES
SERVICE INDUSTRY




1990

SOURCE: BUREAU OF ECONOMIC ANALYSIS
APRIL 1991

# Overview and Perspectives

At this time of year it is appropriate to begin a discussion of Wyoming's economic condition with a few comments on tourism. The Division of Tourism's spring advertising campaign, which includes 30-second commercials on the Discovery Channel and The Nashville Network, is in full swing. Through March the Division has received 94,000 inquiries from potential visitors, 66,000 in March alone. The March total boasts an increase of over 10,000 from March a year ago. Visitations in the 1st quarter of 1991 are up from a year ago at Yellowstone, Grand Teton, Devils Tower, Fossil Butte, Fort Laramie and the southern portion of the Big Horns. For an expanded look at the effects of tourism on Wyoming's economy see the feature article in this edition.

The Bureau of Economic Analysis recently released their Regional Economic Profiles. This report, while always 2 years behind, provides data down to the county level and for Metropolitan Areas. In 1989 Wyoming's per capita personal income (PCPI) stood at $14,554.00. This compared to a U.S. total of $17,592.00. Teton County maintained the highest PCPI at $23,337, followed by Natrona County at $16,241. (see Table 1). Table 2 indicates earnings by Major Industry in thousands of dollars for Wyoming. Within the Private sector the Service industry contributes the most earnings at 844,235 (thousands) followed by Mining (776,850), Transportation and Public Utilities (542,498), and Retail trade (459,721). The Service industry contributed the most earnings in 10 counties, Mining in 8 counties, Transportation and Public Utilities in 4 counties, and Manufacturing was the top contributor in 1 county. The report includes data on Personal Income by major source and Earnings by major industry, Farm Income and Expenses, Transfer payments, and Full and Part-time employees by major industry. Interested individuals can contact the Survey Research Center for any of this information, from 1984-1989.

At the beginning of the 1st quarter 1991 Wyoming's unemployment rate of 7.7% was above the U.S. rate of 7.0%. By the end of the 1st quarter, however, US unemployment had increased to 7.1% while Wyoming had dropped to 6.0%. Lincoln County had the highest unemployment rate in the 1st quarter posting rates of 11.6%, 10.2%, and 9.7 for the first 3 months of 1991. On the other side of the coin, Teton County's unemployment rates were 3.9%, 3.4%, and 2.9% for January, February, and March respectively. Unemployment was up in January in 21 of the 23 counties. However in February, all but 2 of the counties registered a decrease in unemployment from January figures.

**Table 1** Per Capita Personal Income 1989

| County | Dollars | % of Natl. Average |
|---|---|---|
| Albany | 14170 | 81 |
| Bighorn | 11495 | 65 |
| Campbell | 15663 | 89 |
| Carbon | 14564 | 83 |
| Converse | 13180 | 75 |
| Crook | 13161 | 75 |
| Fremont | 11869 | 67 |
| Goshen | 12428 | 71 |
| Hot Springs | 13840 | 79 |
| Johnson | 13836 | 79 |
| Laramie | 15139 | 86 |
| Lincoln | 11209 | 64 |
| Natrona | 16241 | 92 |
| Niobrara | 13624 | 77 |
| Park | 14828 | 84 |
| Platte | 12042 | 68 |
| Sheridan | 15173 | 86 |
| Sublette | 14827 | 84 |
| Sweetwater | 14717 | 84 |
| Teton | 23337 | 133 |
| Uinta | 12282 | 70 |
| Washakie | 13160 | 75 |
| Weston | 14497 | 82 |
| State | 14554 | 83 |

**Table 2** Earnings by Major Industry 1989

| Industry | Thousands of Dollars |
|---|---|
| Farm | 44,015 |
| Private | 3,608,965 |
| Govt. and Govt. Enterprises | 1,222,047 |

There were 398 new domestic corporations and 201 foreign corporations applying for charters in the first quarter of 1991. This compared to 365 and 231 respectively for 4th quarter 1990 and 316 and 196 for a year ago.

Wyoming's average monthly active rig count was 29 in January, fell to 26 in February, and was back up to 29 by the end of the quarter. These figures represent a slight downward trend in the number of active rigs over the last several quarters.

## Terry's Trivia

The 1990 census counted 102,263,678 housing units in the United States, a gain of almost 14 million units or nearly 16 percent over 1980.

The South and West accounted for most of the growth, increasing their housing stock by about 10 million units. More than one-third of the nation's increase came in California, Florida, and Texas. Nevada had the largest proportional increase at 53 percent, followed by Arizona with 49 percent.

Terry Haven
Editor
Survey Research Center
University of Wyoming

# Spring Minerals Update

At the end of the fourth quarter of 1990, the world was braced for the impending war in Iraq. Before the end of the first quarter of 1991, the war had started and ended. And as a result of these events, the average posted price of Wyoming crude oil fell every month since its October high of $35. By March, 1991, the average posted price for Wyoming sweet was under $20 per barrel. This translates into a first purchase price below $18, which is less than the average first purchase price in 1990. The $21 in 1990 was the highest average price since 1985. For the near-term, posted oil prices now look like they may stay down in the high teens and low 20s, which is not that much different from what they were before Iraq's invasion of Kuwait. There is still a downside risk of even lower prices in 1991.

Petroleum Information's preliminary estimate of 1990 oil production from Wyoming is 103.8 million barrels, which is slightly below our estimate of 104.4 million barrels. As expected, production declined about five percent from 1989 production.

Contracted natural gas prices, which had given every indication of starting back up, have also apparently fallen in the first quarter of 1991. And the spot market price at Opal, Wyoming, dipped below $1.10, which is the lowest it has gone since July of 1989. While no one talks about a gas bubble anymore, it is apparent that there is more than an adequate supply of natural gas to meet current market demands.

Development drilling for natural gas in southwestern Wyoming, however, has not been slowed by lower prices. With the Kern River pipeline to southern California already under construction and plans proceeding on the Altamont line from Canada, there are new markets coming open and apparently everyone wants to be ready. Meanwhile, Kern River Transmission Co. has still not made any decision in regard to the State's stipulations on a proposed $250 million loan to the company. The State extended the deadline for Kern River's decision into the second quarter of 1991.

Petroleum Information's preliminary estimate of 1990 natural gas production from Wyoming is 897.8 billion cubic feet. Our estimate is 950 billion cubic feet. In either case, 1990 production should be more than 30 percent higher than production in 1989.

As expected, in 1990, coal production from Wyoming mines set another record. The 184 million tons produced in Wyoming exceeded our earlier estimate of 179.2 million tons. Wyoming also remained the top coal-producing state in the Nation. With no tonnage estimates available for the first quarter of 1991, it is really too early to tell if our forecast of 187.6 million tons for 1991 is low.

In the first quarter of 1991, there were no surprises in regard to coal prices. Prices announced during the quarter were under $4.00 per ton. The **COAL UPDATE** in this issue describes 16 new sales of Wyoming coal.

A potential concern for the coal industry was the threatened national railroad strike. A prolonged railroad strike could have had serious consequences for the coal mines in Wyoming since 92 percent of the coal produced in the State is transported by rail. In a year, it takes more than 15,000 unit trains, each with a capacity of 11,000 tons, just to haul this amount

of coal to its destinations and another 15,000 trains come back empty This number equates to more than 82 unit trains a day, coming and going. Because not all coal haulage is by unit train, it actually takes even more trains. An extended strike would have also affected the trona mining companies since most of their products are also shipped by rail.

During the 1991 Session, the Wyoming Legislature extended the two percent severance tax break to the uranium industry for four more years. Although this tax incentive will help, the outlook for the state's uranium industry did not improve in the first quarter. While Wyoming still has the second-largest resource of uranium in the Nation and two active uranium-mining operations, it looks like the future of uranium mining in Wyoming is very much dependent on the fate of import restrictions as well as on the possible sale of Federal uranium stockpiles.

In the first quarter, there was also interest in aggregate, decorative stone, limestone, silica, black trona water, base and precious metals, and diamond.

Gary B. Glass
State Geologist
Geological Survey of Wyoming

## OIL AND GAS UPDATE

Crude oil prices continued their decline during the first quarter of 1991. The average posted price for Wyoming sweet crude oil was $35 per barrel in October, 1990, but has dropped every month since then. By March, 1991, the posted price was under $20 per barrel. The average first purchase price for Wyoming crude oil was just over $21 per barrel for 1990. This price is an improvement over the past four years and is the highest average price since 1985.

Oil producers were more than able to make up the lost production from Kuwait and Iraq during the war. Even with most of Kuwait's oil wells on fire and not expected to produce significant oil for world markets in the next few years, it appears that crude oil supplies will be adequate. If OPEC does not cut production over the next few months, however, crude prices could decline further.

Spot prices for natural gas also declined during the first quarter of 1991. Because January and February temperatures were above normal, supplies of natural gas were more than adequate to meet winter demand. While prices are normally lower from March through September, the March spot price in 1991 is already lower than it normally is during the low-demand months of June, July, and August.

The average rig count for Wyoming during the first quarter was very slightly higher than it was during the first quarter of 1990. Activity in horizontal drilling and in gas exploration and development apparently accounted for most of the increase. The average annual rig count has been below 40 for the last five years.

A preliminary estimate of oil production for 1990 from Petroleum Information (1991b) shows that Wyoming produced 103,855,349 barrels, which should rank Wyoming in fifth place nationally. Wyoming's 1990 production, however, is a decline of nearly 5.2 million barrels (4.8 percent) from 1989 production. It is unlikely that this rate of decline will change much in the next few years. Petroleum Information's estimated production is about 0.5 percent below our estimate of 104.4 million barrels. The official 1990 production is still not available.

A preliminary estimate of natural gas production for Wyoming (Petroleum Information, 1991b) shows that production reached an all-time high of 897.8 billion cubic

feet in 1990 (an increase of 31.8 billion cubic feet over 1989 production). This estimate includes methane, helium, and carbon dioxide production and is about 0.8 percent lower than our estimate of 905 billion cubic feet. Based on total gas production, Wyoming should be the fourth largest natural gas-producing state in 1990. Again, there are no official production figures available yet.

Wyoming's annual gas production has increased over 300 billion cubic feet since 1986, a 50 percent increase. Natural gas production in the State will continue to increase as increased gas usage accelerates development of the State's large gas resources (3,813.1 trillion cubic feet).

Construction of the Kern River pipeline from Wyoming to California began in the first quarter of 1990. Kern River secured bank financing for the pipeline but is still negotiating a $250 million low-interest State loan. This pipeline is the largest pipeline built since 1981, and its construction is spurring other pipeline activity in southwestern Wyoming.

Northwest Pipeline recently completed a new 22.5-mile, 20-inch-diameter gathering line that can deliver gas production from fields on the Moxa arch to the company's gas processing plant at Opal, Wyoming. The capacity of the new gathering line is 200 million cubic feet of gas per day. Gas from the plant can be delivered to Colorado Interstate Gas, Northwest Pipeline, and to Kern River when it is completed. Northwest has signed long-term gathering and processing contracts with most of the major gas producers in the area and may expand their processing plant at Opal.

Northwest also plans to expand their pipeline system which passes through southwestern Wyoming. According to a Northwest Pipeline spokesman, the 534 million cubic feet per day expansion will benefit Wyoming gas producers since roughly 30 percent (160 million cubic feet per day) will come from Wyoming gas fields on the Moxa arch. This production will add nearly 60 billion cubic feet of gas to the State's annual production. If the Federal Energy Regulatory Commission (FERC) grants Northwest a timely construction certificate, Northwest Pipeline's expansion could be completed by 1992.

FERC has given initial approval for construction of Altamont Gas Transmission Company's proposed pipeline. If Altamont's plans go as expected, they will transport Canadian gas through Montana and Wyoming and hook into the Kern River pipeline where it originates in southwestern Wyoming.

There were 146 more well completions in Wyoming in 1990 than in 1989 (Petroleum Information, 1991a). Both oil completions and gas completions increased substantially. Gas completions were at their highest level in the last six years. Increased gas completions were a direct result of increased drilling in the Greater Green River Basin and of continued exploration for coalbed methane. Construction of the Kern River pipeline and its anticipated completion in early 1992 should keep gas completions high in 1991 as well.

Successful wildcat wells in Wyoming that are drilled between January 1, 1991, and December 31, 1994, will be eligible for a four percent reduction in the severance tax rate for a period of four years from the date of first production. The current severance tax rate for the majority of production is six percent.

Phillips Petroleum is closing their Casper exploration and production office. The closing will affect 15 people who were offered jobs at other locations. Over the past few years, Amoco, Chevron, Marathon, and Gulf Oil companies have all closed their Casper offices.

Lease sales in the State did very well in the first quarter of this year. The State Land and Farm Loan Office's January sale had a high

per-acre bid of $401 made by Kenneth Berry for a 160-acre parcel covering NW section 16, T50N, R71W. The lease is a mile west of Minnelusa oil production at Superhornet Field.

Chesapeake Operating picked up 59 parcels in southeastern Wyoming in Laramie and Goshen counties. These parcels are in and around the recent horizontal-drilling play in the Niobrara (see **Horizontal Drilling**, p.10). Yates Petroleum was the high bidder on 61 parcels that are spread across the State.

The high per-acre bid at the State Land and Farm Loan Office's March sale was $110 by Brown Operating for a 640-acre parcel that covers section 36, T51N, R71W. The parcel is near Minnelusa oil production at Dutch Field and shut-in Minnelusa oil production at Springen Ranch Field.

In regard to total revenue, the U.S. Bureau of Land Management's (BLM) February sale was the best in several years. The sale's top bid of $16,000 per acre was made by Kerr-McGee corp. for a 160-acre parcel that covers SW section 24, T36N, R76W. The parcel is just north of Derrick Draw Field where Kerr-McGee is producing oil and gas from the Muddy Sandstone and from an interval that includes the Carlile, Frontier, and Belle Fourche formations. The total bonus on this parcel was $2.56 million.

Scientists at the University of Wyoming are investigating a relatively new idea for hydrocarbon traps (pressure chambers) and have found evidence that this type of trap exists in the Powder River Basin. In 1975, two Amoco scientists first hypothesized the existence of pressure chambers, which are buried units of porous rock sealed within impermeable layers of other rock. These pressure chambers have the potential to hold significant amounts of oil and natural gas. Dr. Ronald C. Surdam, a University of Wyoming geology professor, is the project director. The research is funded by a $1,562,619 grant from the Gas Research Institute, and involves faculty from the geology/geophysics, petroleum engineering, chemical engineering, and mathematics departments.

A new 1:500,000-scale oil and gas map of Wyoming was published by the Geological Survey of Wyoming during the first quarter of 1991. The large color map shows the locations of over 1,000 fields as well as pipelines, refineries, and gas processing plants. Fields are color-coded to the age of the predominant reservoir rocks. Pipelines are color-coded to the type of products that they transport. The pipelines are also annotated with the name of the operator, their diameter, and the direction of flow.

The Geological Survey of Wyoming (GSW) recently completed work on a $24,000 grant for the U.S. Department of Energy (DOE) through the Geoscience Institute for Oil and Gas Recovery Research. The Institute is a consortium of 24 universities and state geological surveys and is located at the University of Texas at Austin. The reservoir heterogeneity of over 160 of the main oil-producing reservoirs in the State were classified according to depositional environment, diagenetic overprint, and structural compartmentalization. In a cooperative effort with the Utah, Colorado, and Montana geological surveys, the GSW also coordinated the classification of heterogeneity of Utah, Colorado, and Montana reservoirs. DOE will use the heterogeneity classifications of reservoirs from all oil-producing states to help determine where additional research on enhanced oil recovery techniques might be the most successful.

The Texas Bureau of Economic Geology (TBEG) and the Geological Survey of Wyoming (GSW) are collaborating on a study of tight gas sands in the Frontier Formation of southwestern Wyoming. Completion data for more than 600

Frontier wells were compiled and provided to TBEG. In addition, the GSW prepared a detailed map of oil and gas fields in the Greater Green River Basin and Overthrust Belt of Wyoming. This map will be published later this year. The GSW's portion of the project is funded by a $48,000 grant from TBEG. The study is being done for the Gas Research Institute.

In the second quarter of 1991, the Geological Survey of Wyoming anticipates starting work on the Wyoming portion of an atlas of Rocky Mountain gas reservoirs. This project is also for the Gas Research Institute. The atlas will contain descriptions and maps of the major gas plays in Wyoming and will include geologic, engineering, and production parameters of individual reservoirs in each play.

**Exploration and Development**

Company data and information compiled and published by Petroleum Information indicate the following significant exploration and development events occurred in Wyoming during the first quarter of 1991. Activities related to horizontal drilling and coalbed methane are discussed in separate sections.

A. Chevron USA began drilling their 1-11 Chevron-UPRC well in SE SW section 11, T14N, R120W in the Overthrust Belt. The well is about a mile southeast of Nugget Sandstone oil and gas production at Glasscock Hollow Field and is scheduled as a 17,000-ft. Nugget test.

B. Presidio Exploration completed their 30-36 Golden-State well in NE SW section 36, T24N, R111W. The well is in Mesa Field and it flowed 1.8 million cubic feet of gas per day from the Frontier.

C. Presidio Oil Co. completed their 20-1 Whiskey Buttes well as a new discovery in the Dakota. The well, in SW NE section 1, T21N, R111W, flowed 1,147 barrels of oil and 1.9 million cubic feet of gas per day and is over a mile southwest of Dakota production at Sugarloaf Butte Field.

D. Union Pacific Resources extended Dripping Rock Field with their 9-1 Oxy-Federal well in SW NW section 9, T14N, R94W. The well flowed 4.0 million cubic feet of gas per day from the Almond Formation. Celsius Energy extended the field to the south with the completion of their 20-1 Celsius Federal well in NW SE section 20, T14N, R94W. The well flowed 2.6 million cubic feet of gas per day from the Almond.

E. BWAB Inc. has discovered a new, deeper gas pool in Castle Garden Field. The 13-23X Federal well in NE SW section 13, T34N, R91W, produced an average of 628,000 cubic feet of gas per day during 20 days of production in December, 1990. This new pool is in the Frontier Formation. Castle Garden was discovered in 1958 and has produced gas from the Shannon.

F. Louisiana Land and Exploration began drilling a 25,000-ft. Madison test on the Madden anticline. The 3-36 Big Horn well in SE SE section 36, T39N, R91W will take over a year to drill. This will be the fourth Madison test on the anticline. Two earlier wells tested high flow rates from the Madison and a third well is currently drilling below 19,000 feet. Production from the Madison at Madden will probably begin in 1992 when a gas plant is scheduled for completion. The $50 million plant initially will process gas from the two completed wells. The plant may be enlarged if the two wells that are currently drilling find economical gas volumes. In addition to methane, the plant will produce three railroad cars of sulfur a day and carbon dioxide that could be used in enhanced oil recovery projects proposed for oil fields in the Wind River and Bighorn basins.

G. Continental Trend Resources set production casing to evaluate Cretaceous sandstones at their 1-1 Whitetail Federal well in SE SW section 1, T55N, R71W. The nearest production from Cretaceous reservoirs is from the Muddy Sandstone at White Field. White Field is over four miles southwest of this well.

H. Plains Petroleum Co. completed their 23-28 Plains-Federal well in NE SW section 278, T53N, R68W, in the Minnelusa Formation. The well pumped 352 barrels of oil per day and was drilled as a stepout to Cambridge Field.

I. Maxus Exploration recovered oil on a drillstem test of the Minnelusa at their 1 Alpha Unit well in SW SW section 1, T51N, R69W. Pipe recovery was 2,650 feet of oil and 400 feet of water.

J. Flying J Exploration and Production Co. discovered oil in the Minnelusa at their 10-25 Thompson well in NW SE section 25, T51N, R69W. The well pumped 631 barrels of oil per day and is a mile north of Minnelusa oil production at Stewart East Field.

K. Raymond T. Duncan, Inc. completed a new Minnelusa discovery. The 33-13 Record well in NW SE section 13, T50N, R71W, pumped 584 barrels of oil and one barrel of water per day. The new discovery is less than a mile from Minnelusa oil production at FD Field.

L. Caza Exploration is testing their 3 Tigers Tail well in SE NE Section 23, T50N, R71W. An earlier drillstem test of the Minnelusa recovered 1,105 feet of gas-cut oil and 180 feet of oil-cut mud. The well offsets Caza's 2 Tigers Tail well in SW NE section 23, T50N, R71W, which is producing oil from the Minnelusa.

M. L&W Group discovered oil and gas at their 1 Federal well in SW NW section 32, T49N, R66W. A drillstem test of the Lakota recovered 1,140 feet of gas-cut oil and 2000 feet of oil and gas-cut mud. The nearest Lakota production is nearly three miles away at Wind Creek Field.

N. Raymond T. Duncan, Inc. completed a new Minnelusa well in Maysdorf Field. The 44-17 Hayden well in SE SE section 17, T47N, R71W, pumped 359 barrels of oil per day.

O. Duncan Energy found oil in the Minnelusa at their 2 L.A. Sims well in SE SE Section 30, T47N, R71W. The well pumped 60 barrels of oil per day. Nearest Minnelusa oil production is less than a mile south at Haight Field.

P. Cramer Oil discovered oil in the Minnelusa at their 36-15 State well in SW SE section 36, T47N, R71W. The well pumped 406 barrels of oil per day.

Q. Ampolex Inc. discovered oil and gas in the Muddy at their 21-18 Wilson well in NE SW section 28, T46N, R72W. The well pumped 72 barrels of oil and 70,000 cubic feet of gas per day. The new discovery well is in a shallower pool in Lea Springs Field. Ampolex discovered Minnelusa oil at Springs Field in 1990.

R. Kerr-McGee completed another Dakota producer in Buck Draw North Field. The 13-7 NBDU well in NW SW section 7, T41N, R73W, flowed 1,485 barrels of oil and 2.99 million cubic feet of gas per day.

S. Phillips Petroleum Co. discovered oil and gas at their 1 Pine Ridge-Federal well in NE SE section 10, T37N, R76W. The well flowed 156 barrels of oil and 153,000 cubic feet of gas per day from the Muddy Sandstone. The well is three miles from Muddy, Frontier, and Dakota oil and gas production at Sand Dunes Field.

T. Kerr-McGee Group Corp. completed two producing wells in Derrick Draw Field. The 33-35 Derrick Draw-Federal well in NW SE section 35, T36N, R76W, pumped 377 barrels of oil, 287,000 cubic feet of gas, and three barrels of water per day from an open-hole interval in the Carlile, Frontier, and Belle Fourche formations. The 11-36 State-Derrick Draw well in NW NW section 36, T36N, R76W, flowed 2,116 barrels of oil and 1.8 million cubic feet of gas per day from the Muddy.

**Horizontal Drilling**

During the first quarter of 1991, the following significant activities related to horizontal drilling occurred. The discussions are based on company data and on information compiled and published by Petroleum Information.

A. Horizontal drilling in the Niobrara Formation continues in and around Silo Field. Union Pacific Resources completed their 1H Goertz 5-12 well in NE NW section 12, T15N, R65W, for an initial pumping potential of 368 barrels of oil, 136,000 cubic feet of gas, and six barrels of water per day. Their 1H Epler 14-7 well in SW SW section 7, T15N, R63W, was completed for an initial pumping potential of 280 barrels of oil and 72,000 cubic feet of gas per day. Union Pacific Resources is drilling their 2H Leroy Goertz 14-3 well in SW SW section 3, T15N, R64W, and staked a location for a well in NE NE section 22, T16N, R65W. Snyder Oil reached a depth at their 10-21H Hutton well in SW NW section 21, T16N, R64W, but test results are not yet available. Two companies, not previously active in the Niobrara play, staked well locations: Exxon staked a location in SE SW section 6, T15N, R64W, and Cimarron Operating Co. staked a location in SW SW section 26, T16N, R64W. Gerrity Oil and Gas Company began drilling their 4-9H State Well in NE SE section 4, T15N, R64W. The Niobrara in the Silo Field area is between 7,500 and 8,500 feet deep.

B. Union Pacific Resources (UPR) began drilling their 1 H Hellbaum 11-11 well in NW NW section 11, T21N, R66W. The well is about 12 miles south of Chugsprings Field, an abandoned Niobrara and Codell producer. UPR's well will test the Niobrara at a depth of about 8,500 feet.

C. Amoco has not started their 1-25 Morton Ranch well in NE SW section 25, T33N, R72W. Amoco staked the location last quarter and plans to evaluate the Niobrara in the curved part of the hole and Frontier in the horizontal part of the hole. The true vertical depth of this test is about 11,400 feet.

D. Harvey E. Yates Co. reached a true vertical depth of 9,010 feet at their 1 H-19-22 Stuart Ranch deep well in SE NW section 19, T44N, R71W. The well was drilled to test the Niobrara; however, test results are not yet available.

E. GLG Energy has not released any details on their 5,500-ft. Niobrara test in SW NE section 6, T38N, R77W. The company staked another location for a 4,089-ft. Niobrara test in NW NE section 3, T39N, R78W. Drilling has not yet started at a location staked last quarter (SE SE Section 36, T39N, R78W). The true vertical depth targeted for that well is 4,437.

F. Amoco Production completed a relatively shallow horizontal well in two intervals in the Second Wall Creek at Salt Creek Field. The 40 WC2 NE25-H well in NW NW section 30, T40N, R78W, pumped 10 barrels of oil and 3,319 barrels of water per day from producing intervals at about 1,780 feet (true vertical depth).

G. Texaco, Inc.'s shallow Almy (Fort Union) well with three horizontal legs produced

an average of 17 barrels of oil per day during November, 1990. The well was plugged back to a true vertical depth of 440 feet before the three horizontal legs were drilled.

**Coalbed Methane**

During the first quarter of 1991, the following significant activities related to coal bed methane occurred. The discussions are primarily based on information supplied by company personnel. Some information comes from reports compiled and published by Petroleum Information. Nancy Doelger of the BLM provided useful information for the Powder River Basin operations.

A. Betop and Martens and Peck Operating are producing natural gas from 10 Fort Union coalbed methane wells in Rawhide Butte Field in T51N, R72W. An additional well in the field, operated by National Coop. Refining is presently shut-in. All these wells are less than 1,000 feet deep.

B. Petroleum Inc. is no longer producing their four, Fort Union, coalbed methane wells in Dead Horse Creek Field in T49N, R75W. Indications are that these 1,200-1,800 feet deep wells will be abandoned.

C. Gilmore Oil and Gas is dewatering their 1 Artesian Unit well in SE NE section 1, T49N, R77W. The 1 Artesian Unit well was a 2,418-ft. test of coal beds in the Fort Union Formation. Gilmore still has plans to drill a second well in the same section.

D. Operations at Coastal's wells in the Sasquatch Unit were suspended. Another company has expressed an interest in resuming operations in this area at a later date. Coastal's wells were drilled to test the Big George coal bed at depths between 1,000-1,500 feet. This coal bed is in the Fort Union Formation.

E. Texaco, Inc. plugged and abandoned their 1,500-ft. 1 Texaco-Lott-Fee well in SE SE Section 13, T52N, R82W. The well was completed to test the coalbed methane potential of coal beds in the Wasatch Formation.

F. METFUEL is dewatering their 3-1 UPRR-Palm Livestock well in NE SE section 3, T23N, R81W and their 11-1 UPRR-Palm Livestock well in NE NW section 11, T23N, R81W. These wells are all completed in Hanna Formation coal beds at depths below 3,500 feet. METFUEL may drill additional wells this summer.

G. Fuel Resources Development is producing methane and water from 11 wells in the newly named Dixon Field. The field straddles the Wyoming-Colorado border and seven of the wells are in Wyoming. The wells are all producing from two steeply dipping coal beds in the Almond Formation and are all on fee land. The depths of production are between 900 and 2,300 feet. The company has tentative plans to drill more wells after they evaluate the 11 producing wells.

H. Triton Oil and Gas Corp.'s plans to develop coalbed methane in Mesaverde coals are still on hold. Triton tested several coal beds between 900 and 4,100 feet at two wells drilled in late 1989. Triton is awaiting a decision by the BLM on whether an environmental impact statement is necessary before development can begin. In an adjacent area, Saxon is testing two Mesaverde coalbed methane tests drilled in section 7, T25N, R102W and in section 23, T25N, R103W. Although Saxon's wells were drilled to 7,000 feet, the depth of the coal beds that they are testing has not been disclosed.

**Huff n' Puff Carbon Dioxide Projects**

A total of 31 carbon dioxide huff n' puff tests were performed on oil wells in Wyoming through the end of 1990 (Deans, 1990). The first test began in November, 1989, at Wold's

Crooks Gap #4 well and an additional 30 tests were performed in 1990. At the present time, test results have not been reported for most of the projects. The first major presentation of results is scheduled for the Seventh Annual Enhanced Oil Institute (EORI) Symposium in Casper, May 1-2, 1991.

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## COAL UPDATE

In 1990, coal production from Wyoming mines set another all-time record for the fourth consecutive year. This production ranked Wyoming as the top coal-producing state in the United States for the third straight year, surpassing second-place Kentucky's 179.0 million tons and third-place West Virginia's 170.5 million tons. The 184.0 million tons of coal reported by the Wyoming State Inspector of Mines represents a 7.5 percent, 12.9-million-ton increase over the 171.1 million tons produced in 1989. This production is also 4.5 million tons above our forecast made in October, 1990. Cumulative coal production from Wyoming mines between 1865 and 1990 exceeds 2.2 billion tons.

National coal production in 1990 broke the 1-billion-ton mark for the first time, as 1.022 billion tons of coal were produced. This represents a 4.1 percent, 41-million-ton increase in national production over 1989. Wyoming accounted for about 18 percent of the national total and about 46 percent of the 401 million tons of coal produced in states west of the Mississippi River.

Most of the increase in Wyoming coal production for 1990 occurred in the Powder River Coal Field, which recorded a 12.7-million-ton, 8.4 percent increase over 1989 production. The Powder River Coal Field accounted for 88.4 percent of Wyoming's coal production in 1990. In this field, Campbell County coal production alone increased from 143.8 million tons in 1989 to 154.7 million tons in 1990 (a 7.5 percent increase) and accounted for about 84 percent of the State's production. Converse County experienced an increase in production of 29 percent in 1990 and accounted for 4.3 percent of the State's total production (7.9 million tons), as compared to its 3.6 percent share in 1989.

The Hanna and Bighorn coal fields also recorded increased production. Production from the Green River and Hams Fork coal fields, however, was slightly less in 1990 than in 1989.

A total of 31 coal mines reported production in 1990, as compared with 27 mines in 1989. All but four of the State's mines were surface mines. Two additional coal mines in Campbell County, Dry Fork Coal Company's Dry Fork mine and Shell Mining Company's North Rochelle mine, reported some production in 1990. An additional mine in the Green River Coal Field (Sweetwater County) was active in 1990 as Arch of Wyoming's Pilot Butte underground mine (formerly Bitter Creek Resources' Stansbury mine) resumed production.

The fourth new mine was Wyoming and West Virginia, Inc.'s remotely-controlled underground mine in the Hanna Coal Field (see **Developments in the Hanna Coal Field**, p. 16).

In 1990, coal production from Wyoming's four underground coal mines (1.8 million tons) increased by 0.2 million tons (or 13 percent) over 1989 production. A slight decrease in coal production at Cyprus-Shoshone Coal Company's Shoshone No. 1 mine in the Hanna Coal Field was more than offset by increased production at Lion Coal Company's Swanson mine, resumption of production at Arch of Wyoming's Pilot Butte mine (which was closed for renovation in 1989), and production from Wyoming and West Virginia, Inc.'s Blue Sky No. 1 mine. Coal production from underground mines accounts for less than one percent of the State's total coal production.

Employment at Wyoming coal mines increased by 63 employees in 1990, an increase of 1.4 percent over 1989. This is the third year in a row that total employment in Wyoming coal mines has increased. Employment in southern Wyoming and in the Bighorn Coal Field increased by 69 between 1989 and 1990 while employment in the Powder River Coal Field decreased by 6 during the same time period. Campbell County mines experienced a loss of 40 employees, Converse County lost 42 employees, and Sweetwater County gained 73 employees. While total employment in underground coal mines increased by 30 between 1989 and 1990, total employment in surface coal mines increased by 33 during the same period. Coal mine employment was 4,623 in 1990.

Coal deliveries during the last quarter of 1990 were about one million tons a month more than the year before. Similarly, the amount of unreported deliveries was also higher than anticipated. Unreported deliveries of 7.5 million tons of coal in 1990 included coal used for industrial and commercial purposes, coal delivered in small amounts for test burns, and coal delivered to electric utility plants rated at less than 50 megawatts.

During the last quarter of 1990, the amount of spot coal and its percentage of the total coal delivered to electric utility companies continued increasing. For example, almost 18 percent of all coal delivered to electric utilities in the last quarter of 1990 was spot coal. In December alone, spot coal accounted for 19 percent of all coal delivered to electric plants. During the first half of 1990, spot sales were only 13 percent of the total coal deliveries. For all of 1990, spot sales accounted for at least 25.8 million tons or 14.6 percent of all coal sold to electric utility plants. If theses spot sales are combined with the sales of other low-priced coal i.e., coal sold for less than $5.00 per ton, approximately 24 percent of the coal sold in 1990 was at prices below $5.00.

Wyoming coal was delivered to electric utilities in 22 states in 1990. Of these, only seven states (Texas, Arkansas, Illinois, Louisiana, Oklahoma, Colorado, and Washington) received less coal in 1990 than in 1989. Coal deliveries to Texas were 1.6 million tons less. Significant increases in coal deliveries were noted to Georgia (up 2.2 million tons), Indiana (up 4.0 million tons), Iowa (up 1.8 million tons), and Michigan (up 1.3 million tons).

Despite a 7.5 percent increase in coal production in 1990, we are still predicting only a five percent increase in coal production statewide for 1991 (187.6 million tons). Coal production from the Powder River Coal Field should increase again in 1991, but there is still no evidence that markets for Wyoming coal have changed appreciably since last year. Additional utility companies will be testing low-sulfur Wyoming coal in 1991 as they assess their options for meeting the impending acid rain control regulations under the recently passed Clean Air Act Amendments of 1990. While the exact number of utilities that will switch to low-

sulfur coals is not yet known, many of them will likely choose to burn Wyoming coal. This conversion will certainly contribute to the growth of Wyoming coal markets and coal production, but not necessarily on the short-term.

In the last *Quarterly Update*, the lack of uncommitted rail capacity was cited as a possible hindrance to the growth of Wyoming coal markets. Since that report, both the Union Pacific (UP) and the Burlington Northern railroads announced plans to improve their ability to haul coal out of the Powder River Coal Field and to decrease the cycle time for coal unit trains. In January, UP announced a 5-year, $250-million program to upgrade their major coal-hauling trackage in Nebraska, Kansas, Wyoming, Texas, Louisiana, and Missouri. This is part of a $620 million improvement plan. UP, in a joint venture with Western Railroad Properties, Inc., hauls coal out of the Powder River Coal Field to the Joyce siding, in eastern Nebraska. Eastward from Joyce, UP operates a major coal transportation route to midwestern U.S. markets.

Burlington Northern (BN) announced that they would spend upwards of $190 million per year over the next several years to improve their major coal unit train routes. The improvements announced by BN included upgrading trackage, using longer unit trains, using lighter aluminum coal hoppers, and using higher-powered locomotives. In their announcement, BN claimed that they would be able to handle an additional 50-60 million tons of coal a year by 2001.

Chicago and North Western Transportation Company (C&NW) also announced that they intended to do whatever was necessary for them to grow with the demand for additional capacity. The company has spent $55 million in the last two years for additional locomotives to haul coal unit trains.

The impending settlement of two lawsuits involving Wyoming coal were of interest in the first quarter of 1991. The first settlement involves 53.5 million tons of recoverable coal owned by Whitney Benefits, Inc., north of Sheridan. The coal is not minable, however, because it lies in the alluvial valley of the Tongue River. Under the Federal Surface Mining Control and Reclamation Act (SMCRA), Whitney Benefits is entitled to receive compensation for the coal because they have been denied access to it. At issue in this settlement were both the amount of recoverable coal that existed in the area and the value of the coal. A recent decision in the U.S. Court of Appeals upheld an earlier decision in the U.S. Claims Court that set the amount of coal at 53.5 million tons and the value of the coal at $60.3 million, plus interest accrued since August 3, 1977 (the date the SMCRA went into effect). Using these numbers, the coal was valued at about $1.13 per ton.

In the other settlement, the State of Wyoming and a number of coal companies reached an agreement in a lawsuit that involved $25.5 million in protested State severance and ad valorem taxes. At issue in this settlement, were alleged ambiguities in the tax laws that caused coal companies to protest the system of valuation that the State of Wyoming had used in its calculation of ad valorem and severance taxes in past years. The State of Wyoming filed suit in the 1st Judicial District Court for a declaratory judgment. Under terms of the judgment, the State of Wyoming will refund $7 million to the coal companies that filed suit; the remaining $19 million plus interest will be distributed to both the State of Wyoming and several counties. A number of other lawsuits, filed by individual coal companies against the State of Wyoming's valuation methods and tax audits, are still pending.

In the first quarter of this year, the Geological Survey of Wyoming (GSW) published a coal map of Wyoming. This new

color map contains the latest information on the extent of coal-bearing rocks, the outcrops of coal beds, and revised boundaries of many of the State's coal fields. The 1:500,000-scale wall map also shows locations of active, proposed, and abandoned coal mines; railroad routes and unit train loadouts; coal-consuming facilities; planned coal development projects; electrical generation plants; and electrical transmission lines. The map is the first color map of Wyoming at this scale devoted exclusively to coal deposits since 1950. This map complements a 1:500,000-scale coal map of the Powder River and Black Hills coal fields, which the GSW published in 1990.

The Geological Survey of Wyoming (GSW) and the U.S. Department of Energy's Energy Information Administration (EIA) recently entered into a one-year, $74,000 cooperative agreement to quantify the quality of Wyoming's coal reserves. With EIA's assistance, the GSW is characterizing the quality of Wyoming's remaining strippable coal, which is estimated at more than 26.7 billion tons. In addition, the GSW may do a similar characterization of the estimated 38.3 billion tons of coal reserves recoverable by underground mining methods. The EIA is providing $60,000 of the total funding for the project, plus some technical assistance and information. This agreement with the EIA is part of a nationwide effort to characterize the quality of coal reserves. Wyoming was chosen as an early participant because the EIA recognized that there was little analytical data available when Wyoming's reserves were originally calculated prior to the mid-1970s.

For this project, the GSW's Coal Division is preparing maps of the State's known coal reserves and plotting sulfur and heat values (Btu/pound) of the coal beds, which comprise the reserves. Once these reserve maps are prepared, the GSW investigators can report coal quality in pounds of sulfur per million Btu. By reporting the reserves this way, the study will document the amount of compliant coal remaining in Wyoming's coal deposits. While earlier reports indicate that Wyoming has at least 7.8 billion tons of compliant coal, State Geologist Gary Glass feels these estimates are low and that Wyoming probably has at least twice that mu[illegible]mpliant coal. He went on to say that this report will prove him right or wrong on this prediction. "In either case," Glass said, "Wyoming has the largest reserves of compliant coal in the lower 48 states."

Compliant coal refers to coal that utility companies can burn in power plants without expensive scrubbers to remove sulfur dioxide emissions. By putting Wyoming's reserves into several different categories on the basis of pounds of sulfur per million Btu, the completed study will indicate how much of Wyoming's coal reserves are compliant even if New Source Performance Standards (NSPS) change.

The head of the GSW's Coal Division is leading the study, which is now in its fourth month. Currently there are three people working on the project at the GSW's offices in Laramie.

**Developments in Western and Southwestern Wyoming**

This area of Wyoming includes the Bighorn, Green River, and Hams Fork coal fields. Coal production in the latter two coal fields in 1990 (11.9 and 4.7 million tons, respectively) was slightly less than in 1989 while coal production in the Bighorn Coal Field in 1990 (0.1 million tons) was almost double that of 1989. In the Green River Coal field, two underground and two surface mines were active in 1990. While both surface mines decreased production in 1990, both underground mines increased coal production. Coal production and employment data for the Black Butte mine now include data from what was previously known as the Leucite Hills mines.

Two surface mines in the Hams Fork Coal Field (Lincoln County) were active in 1990. FMC Wyoming Corporation's Skull Point mine increased coal production in 1990 while Pittsburg and Midway Coal Mining Company's Kemmerer mine decreased production. Both mines extract subbituminous coal from the Late Cretaceous Adaville Formation.

The Bighorn Coal Field had one active mine in 1990, Northwestern Resource Company's Grass Creek mine. This mine extracts bituminous coal from the Paleocene Fort Union Formation. Most of the production at this mine is used at nearby bentonite plants in the Bighorn Basin, which use it as a fuel in the drying of their products. Trucks haul coal from the mine. The 101,961 tons of coal produced from the Grass Creek mine in 1990 is the largest amount ever produced at the mine in one year. This surface mine has been operating since 1976.

In early March, the Wyoming Department of Environmental Quality notified Utah Power and Light Company (UP&L), a division of Pacificorp, that their 707-megawatt Naughton power plant at Kemmerer was exceeding Wyoming standards for sulfur dioxide emissions. Because the Naughton plant is not currently fitted with flue gas scrubbers, UP&L is discussing its compliance problem with Pittsburg and Midway Coal Mining Company, which supplies coal to the power plant

**Developments in the Hanna Coal Field**

Coal production from the four active mines in this coal field was 4.5 million tons in 1990. Although Arch of Wyoming's Seminoe No. 2 mine did not report any coal production in 1990, 29 workers are still actively employed at the mine doing reclamation work. The underground mining operation conducted by Wyoming and West Virginia, Inc., a subcontractor employed by Arch of Wyoming, uses a remote-controlled, continuous miner to extract coal from beds considered too deep for strip mining. The continuous miner enters a coal bed where it is exposed at the base of the final highwall of the strip mine. Guided by video cameras mounted on the front of the continuous miner, coal is extracted downdip from the exposed coal face. A conveyer belt behind the continuous miner carries the mined coal to the surface where it is loaded onto coal haulers, which transport the coal to loadout facilities at the Medicine Bow mine.

A unit train of coal from Arch of Wyoming's Medicine Bow mine was apparently tested in December, 1990, at Arizona electric Power Cooperative's Apache power plant in southeastern Arizona. This power plant normally uses coal from the San Juan or Raton basins in New Mexico. The coal originated on the Union Pacific Railroad and terminated on the Southern Pacific. No other details on the spot sale were available.

**Developments in the Powder River Coal Field**

The nineteen active surface mines in the Powder River Coal Field collectively produced 12.7 million tons more coal in 1990 than in 1989. Only two mines in the coal field produced less coal in 1990 than they did in 1989. Neither the Fort Union mine, which produces coal for the K-Fuels Project, nor Thunder Basin Coal Company's Black Thunder mine exceeded 1989 production. Despite a production drop of 1.6 million tons, the Black Thunder mine still produced 27.9 million tons of coal in 1990 and for the ninth straight year, led both the State and the Nation in coal production from a single mine. Eight surface mines, including the Belle Ayr, Eagle Butte, Caballo, Rawhide, Cordero, Jacobs Ranch, Rochelle, and Black Thunder mines each produced in excess of 10 million tons in 1990.

In another development in the Powder River Coal Field, Cordero Mining Company, a

subsidiary of Sun Coal Company, is cooperating with Carbontec Wyoming, Inc. of Bismarck, North Dakota, in a coal-drying project. Cordero will furnish subbituminous coal from their coal mine south of Gillette to Carbontec's 20-short ton-per-day demonstration plant in Bismarck. Carbontec received a $1.0 million loan from the Wyoming Investment Fund Committee in 1989 for testing Wyoming coal in the project. Carbontec's process can upgrade a typical subbituminous coal with 30 percent moisture and a heat value of 8,500 Btu/pound to a product having 10 percent moisture and a heat value of 11,500/Btu pound. If the demonstration plant is successful, a commercial coal-drying plant might be built at the Cordero mine.

**Coal Contracts - Powder River Coal Field**

During the first quarter of 1991, coal purchasing activities in this coal field were less numerous than the last quarter of 1990. Most of the coal purchased in the first quarter was on the spot market. There were, however, slight increases in the number of coal sales for test burns and for blending.

New coal contracts and sales are summarized below:

1.) Thunder basin Coal Company's Black Thunder mine and Nerco Coal Company's Antelope mine are supplying an undisclosed amount of coal to Cyprus Silver Power Group's 135-megawatt cogeneration plant in Silver Bay, Minnesota. This plant, which started up in 1990, powers a nearby taconite pelletizing plant owned by Cyprus. Cyprus plans to sell any excess power that they generate. The plant could burn as much as 400,000 tons of coal each year at peak capacity. Transportation to the plant is via Burlington Northern.

2.) Cordero Mining Company's Cordero mine is supplying 100,000-200,000 tons of coal to Grand Island Nebraska Electric Department between March 1 and October 31, 1991. The coal is transported by Union Pacific. Bids from four other producers in the Powder River Coal Field ranged from the $3.70 per ton bid submitted by Cordero to $5.40 per ton from Rochelle Coal Company's Rochelle mine. A bid of $3.50 per ton from Carter Mining Company's Rawhide mine was apparently not considered because the mine is only served by Burlington Northern.

3.) In 1991, Amax Coal Company's Eagle Butte mine and Carter Mining Company's Rawhide mine will supply spot coal to Iowa Power, Inc.'s Council Bluffs, Iowa, power plant. Although the volume of coal was not finalized at the time this article was written, the tonnage will probably be 0.5-1.0 million tons. Burlington Northern will transport the coal to the plant.

4.) Mobil Coal Producing, Inc. will furnish 600,000 tons of spot coal from its Caballo Rojo mine to three Iowa Electric Light and Power Company generating plants in Iowa. About 300,000 tons of coal will go to the Sutherland, Iowa, plant; the remaining 300,000 tons will go to both the Prairie Creek and the Sixth Street power plants near Cedar Rapids, Iowa. The coal contract is for 1991.

5.) Powder River Coal Company (a subsidiary of Peabody Holding Company) will supply 320,000 tons of spot coal from its North Antelope mine in southern Campbell County to Wisconsin Power and Light Company's Edgewater, Wisconsin, power station. The Edgewater Unit No. 5 will receive 150,000 tons of the coal; the remainder of the coal will be blended with other coals and used in Edgewater Units 3 and 4. The coal is scheduled for delivery during the first half of 1991.

6.) Amax Coal Company's Belle Ayr mine supplied 160,000 tons of spot coal to Northern Indiana Public Service Company's (NIPSCO's) Mitchell, Indiana, power plant during January and February, 1991. The utility

buys coal from Amax on an "as-needed, as-available" spot contract arrangement.

7. Mobil Coal Producing, Inc. also supplied 160,000 tons of spot coal from its Caballo Rojo mine to NIPSCO's Mitchell, Indiana, power plant during the first two months of 1991. NIPSCO has a similar "as-needed, as-available" contract with Mobil for spot coal supplies.

8.) Amax Coal Company's Belle Ayr mine will furnish Houston Light and Power Company with 750,000 tons of spot coal for the W.A. Parish generating station in Texas. The coal will be delivered throughout 1991 via two routes: Burlington Northern and Atchinson, Topeka & Santa Fe (AT&SF) railroads and via Chicago and North Western, Union Pacific, and AT&SF railroads.

9.) During the first quarter, an undisclosed mine in the Powder River Coal Field furnished 1.0 million tons of spot coal to Georgia Power Company's Scherer generating plant near Macon, Georgia. Southern Company Services, Inc. is the fuel buyer for Georgia Power.

10.) Another undisclosed mine in the Powder River Coal Field furnished Consumers Power Company with 81,000 tons of spot coal during the first quarter of 1991. The coal was for the Weadock, Michigan, power plant.

Coal furnished for test burns is summarized below:

1.) Nerco Coal Company (a subsidiary of Pacificorp) sold an undisclosed amount of coal from its Antelope mine for test burning at Illinois Power Company's Havana, Illinois, power station. The coal was blended with varying amounts of eastern coal as well as burned alone.

3.) Mobil Coal Producing, Inc.'s Caballo Rojo mine will supply 11,000 tons of coal in April, 1991, to Niagara Mohawk Power Company's Dunkirk Unit No. 2 in western New York. The coal will be blended with eastern coal in a 30/70 western/eastern ratio. Burlington Northern is the originating railroad; Bessemer and Lake Erie Railroad will transport the coal to a dock on Lake Erie where it will be blended with the eastern coal; and barges on Lake Erie will take the coal to the Dunkirk plant.

4.) Five coal mines in the Powder River Coal Field, including the Cordero, Buckskin, Belle Ayr, Antelope, and Black Thunder mines, will each supply an additional 100,000 tons of spot coal to the Tennessee Valley Authority (TVA). Previous spot sales of 100,000 tons of coal from each mine were used at TVA's Paradise, Kentucky, generating plant. TVA will use up to 0.3 million tons of the additional coal in tests at their Cumberland, Tennessee, power plant. The remainder of the additional coal will be used in tests at the Paradise plant. Three of the above coal mines will ship coal directly to the Cumberland plant rather than to Paradise.

5.) Amax Coal Company's Belle Ayr mine supplied 40,000 tons of test coal to NIPSCO's Michigan City, Indiana, power station in March 1991.

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## INDUSTRIAL MINERALS AND URANIUM UPDATE

**Aggregate (Construction)**

Rissler and McMurry Co., which was granted a mining permit to operate an aggregate quarry in the Alcova Limestone on Bessemer

Mountain west of Casper, has proposed another quarry site located near Jackson Canyon. This site is nine miles southwest of Casper. If approved, this new site would replace the quarry on Bessemer Mountain. Residents near Bessemer Mountain oppose the Bessemer Mountain quarry location. The U.S. Bureau of Land Management has begun a series of public hearings regarding this new quarry site. There is, however, already opposition to the new site, which is adjacent to an Area of Critical Environmental Concern (ACEC), but not in it.

**Aggregate (Railroad ballast)**

Meridian Minerals, operator of the railroad ballast quarry west of Cheyenne, is still looking for a buyer for the facility. Meridian wants to sell all of its industrial minerals properties. The quarry continues to produce ballast for both the Burlington Northern Railroad (Meridian's parent company), and the Union Pacific Railroad.

The Geological Survey of Wyoming (GSW) is also looking for potential sources of railroad ballast. Railroad Stone Systems, Inc. provided a small unrestricted grant to aid in the GSW's field investigations.

**Decorative Aggregate and Stone**

The Geological Survey of Wyoming has been awarded a grant from Sunrise Stone, Inc. to help them locate sources of decorative stone and to evaluate quarry sites. As a result of this award, Sunrise Stone moved several large, gray, red, and pink marble blocks from deposits in northeastern Platte and northwestern Goshen counties to a staging area north of Guernsey. These blocks will be shipped to out-of-state stone-cutting facilities where they will be cut into slabs and displayed to potential buyers. If there is a demand for these marble products, several quarries could open in the area. Should market demand warrant it, there is also interest in constructing a stone-cutting and processing facility in the Guernsey area.

In late March, Sunrise Stone also opened a test quarry in black amphibolite in northern Albany County. If tests are successful, Sunrise will ship three 4' x 4' x 8' blocks to a stone-cutting facility in Denver in early April. A full-scale quarry could begin production later this spring. Sunrise Stone is also considering other black, blue, green, and red granites in Albany and Carbon counties for future development.

New occurrences of black and red granite and gray and brown marble were located by the Geological Survey of Wyoming in the first three months of 1991. Samples from these occurrences are on display at the Geological Survey of Wyoming building on the University of Wyoming campus.

In a cooperative effort with the Wyoming Department of Commerce's Division of Economic and Community Development, the Geological Survey of Wyoming is preparing an illustrated report, which will have color photographs of decorative stone that occurs in Wyoming. This report should be published in 1991.

**Feldspar**

In 1990, feldspar was mined in Wyoming for the first time since 1982. A Gillette-based company, Wyoming Red Rock, mined and sold feldspar from a pegmatite deposit on Casper Mountain. Feldspar is used in ceramics, in specialty products such as dental materials, as an abrasive, and as decorative aggregate.

**Fertilizer**

Last year, Chevron Chemical Co. announced that its fertilizer plant southeast of Rock Springs was for sale. In mid-February of this year, Chevron reported that it had numerous

inquiries from potential buyers, many of whom were producing fertilizer in other locations. The Rock Springs plant produces fertilizer from phosphate mined in Utah and from sulfur recovered from natural gas produced in Wyoming.

**Gypsum**

Both Celotex at Cody and Georgia-Pacific, south of Lovell, operated their gypsum mines at capacity in 1990 and early 1991. Their capacities are 215,000 and 216,000 tons per year, respectively. These mines produce gypsum which is pressed into wallboard in nearby plants. According to the U.S. Bureau of Mines, the demand for gypsum nationally is strong and increasing due to increased construction. In 1991, it is likely that these plants will continue to produce wallboard at their capacities.

Mountain Cement mines gypsum south of Laramie for use in the manufacture of cement at its 300,000-ton-per-year Laramie plant. In 1991, gypsum production for Mountain Cement should continue at about the same level as 1990.

**Limestone and Lime**

Dakota Coal Company, a subsidiary of Basin Electric Power Cooperative, announced that it was planning to construct a lime plant 25 miles northeast of Guernsey. A subsidiary company, Wyoming Lime Producers, will operate the plant, which will use limestone from the Bass quarry in the Mississippian-Devonian Guernsey Formation near the plant location. The lime is for use in scrubbing sulfur dioxide from stack gas at the Laramie River Power Station near Wheatland, Wyoming and at the Antelope Valley Power Station near Beulah, North Dakota. The plant construction costs are estimated at about $5 million, and the plant will employ about 40 people when completed. This plant should give a needed economic boost to the local area. Platte County lost a greater percent of its population between the 1980 and 1990 censuses than any other county in the Nation. Basin Electric officials report that there is already a long list of applicants for employment at this facility.

Pete Lien, Inc. still plans to develop a limestone quarry and construct a lime plant near Laramie. The company, which has expressed interest in mitigating any negative effects of its quarrying, is considering several quarry locations, both near Laramie and elsewhere. The proposed Laramie operation will employ about 50 people. The Pete Lien quarry will produce about 300,000 tons of limestone a year, which is about the same tonnage quarried each year at the Mountain Cement quarries near Laramie.

Nationally, the production of lime is increasing. The following table from the U.S. Bureau of Mines (1991) shows annual lime production for the last five years:

| Year | Domestic Lime Production (short tons) |
|---|---|
| 1986 | 14,474,000 |
| 1987 | 15,733,000 |
| 1988 | 17,052,000 |
| 1989 | 17,152,000 |
| 1990 (est.) | 17,400,000 |

Lime is used for steel making, stack gas desulfurization, paper and pulp manufacturing, water purification, and soil conditioning.

**Perlite**

The Harborlite perlite plant west of Green River expands perlite mined in Arizona and sells the product (expanded perlite) to the nearby soda ash plants for use as a filter aid.

Production from this plant is expected to increase in 1991 as soda ash production increases.

**Silica**

Interest in silica deposits in Wyoming has continued. Silica ($SiO_2$) is the primary ingredient in glass. A California-based company announced plans to remodel the abandoned Atlantic City iron mine facilities and manufacture glass at that site southwest of Lander. The company is planning to use silica from Platte County and soda ash from the Wyoming trona basin in Sweetwater County. There could be a wrinkle in these plans, however, since it looks like all the buildings at the site of the Atlantic City iron mine will be destroyed or removed as a part of site reclamation (see discussion of South Pass on p.25).

The Geological Survey of Wyoming (GSW) is assisting in the study of a silica sand deposit in John Blue canyon north of Lovell. This project is sponsored by the Town of Lovell, using grant funds from the Wyoming Department of Commerce, Division of Economic and Community Development (formerly called the EDS Board).

In addition, the GSW has received inquiries about silica deposits in Albany, Big Horn, and Platte counties.

**Trona and Soda Ash**

Trona is mined by five companies west of Green River in Sweetwater County. These companies process the trona into soda ash and other sodium-based products. Wyoming is now the Nation's only producer of soda ash. The last non-Wyoming, domestic, soda ash producer ceased production in late 1990. It is not known if this closure is permanent. This plant is in southern California.

The market for soda ash looks like it will remain strong enough in 1991 to set another production record. There are two growing uses of soda ash that have contributed in a major way to increasing demand. Caustic soda, which was once almost exclusively manufactured by processes using chlorine, is now being made from processes that use soda ash instead of chlorine. Regulations governing the use of chlorine have increased chlorine processing costs to levels where a soda ash process is less expensive.

Somewhat ironically, the other growing market for soda ash is its use as a substitute for caustic soda. In some applications, soda ash works as well and is less expensive than caustic soda.

The increase in domestic consumption of soda ash masked a downturn in the export market. China, the largest importer of Wyoming-produced soda ash, cut its purchases significantly, and 500,000 fewer tons of soda ash were exported from the U.S. in 1990 than in 1989. There is some optimism for increased exports in the future since the European Community Commission repealed an anti-dumping duty on soda ash from the U.S. This encourages European countries to begin importing soda ash from the United States.

In Wyoming, Tg Soda Ash announced that construction on a proposed caustic soda plant may begin late in 1991. The $40 million project should employ 200 to 300 construction workers and take two years to build. The plant is a joint venture between Texasgulf and Atochem North American. Both joint venture partners are subsidiaries of Elf Aquitane, Inc., based in Paris, France.

In February, 1991, BWAB Inc., a Denver-based company, announced that it had received the necessary approvals from the U.S. Bureau of Land Management to conduct a test drilling program for black trona water in

southwestern Wyoming. Black trona water is ground water that contains organic materials and is saturated with trona. The organic materials color the water black and make it smell like crude oil. If BWAB's test program near Farson is successful, they plan to produce soda ash from the trona that they recover from the black trona water. In addition, they may be able to produce organic-based fungicides, pesticides, and pigments from the by-product black water.

**Uranium**

The spot market price of $U_3O_8$ dropped from $9.80 to $9.50 per pound in the first quarter of 1991. Low-cost imported uranium has kept the market for U.S. uranium weak. And some international developments may drive the price even lower in the near future.

The Soviet Union (USSR) has apparently mined far more uranium than it could possibly have used during the past forty years. Some industry analysts say there are enormous stockpiles of uranium in the USSR. Recently, the USSR announced sales from their stockpile at extremely low prices. Some domestic utilities, including Yankee Atomic, contracted for uranium from the USSR for use in nuclear power plants. Congress is looking into legislation to prevent low-cost purchases from the USSR stockpile. The U.S. Department of Energy is trying to determine how much uranium is stockpiled in the USSR.

South Africa is another major producer of uranium, and it produces uranium at far lower costs than domestic producers. There has been a sanction on imports from South Africa due to that country's racial policies. Because these sanctions may be lifted soon, the importation of South African uranium may also contribute to a further lowering of uranium prices.

Australia contains the world's largest uranium resources. Because of the high quality of the Australian deposits, their mining costs are far below U.S. mining costs. Although Australia enacted legislation a few years ago restricting production to only three mines, the Australian Labor Party is now reviewing this restriction. Australia is experiencing a major economic recession and may drop the three-mine limit. If it does, additional low-cost uranium will appear on the market.

To add to the woes of uranium producers, a recent story in the magazine *Nuclear Fuel* stated that the U. S. Department of Energy (DOE) planned to sell 7.5 million pounds of uranium on the open market. At current rates of production, this amount is approximately equivalent to eight years of uranium production from Wyoming. Very alarmed, the uranium producing industry went to DOE and to Congress to protest the sale. The DOE says the sale will happen sometime in the future, and that the uranium will be sold gradually, minimizing its effect on prices. Despite what DOE says, many observers predict that the price of $U_3O_8$ will decrease, just as the price of silver decreased when Federal stockpiles were sold.

In Wyoming, Pathfinder Mines, a subsidiary of COGEMA, is mining uranium in the Shirley Basin, and Power Resources, a British-owned company, produces uranium by in-situ solution mining methods from the Highland property and adjoining areas in the southern Powder River Basin. Pathfinder sold part of its property in the Crooks Gap area to U.S. Energy, a subsidiary of Crested Corporation. Pathfinder also purchased the Ruth property in Johnson County and the North Butte property in Campbell County. Both of these properties have mining permits, and Pathfinder plans to develop them for in-situ solution mining.

Families and individuals entitled to federal compensation under the recently passed Underground Uranium Miners Compensation

Act may begin receiving checks later this year. The compensation act provides benefit payments to miners or their families for health problems resulting from working in underground uranium mines prior to 1967. The U.S. Department of Justice is working out the regulations mandated by the legislation. Persons claiming benefits under this law have to wait until the regulations are completed before applying.

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## Metals and Precious Stones Update

Mining companies are already planning reconnaissance exploration studies in Wyoming for the upcoming field season. Contacts and inquiries directed to the Geological Survey of Wyoming indicate that exploration in the State this summer and fall may surpass that of last year, even though the mining industry is in another recession. A modest increase in diamond exploration is expected. Some exploration for gold and possible property development is anticipated in South Pass and the Black Hills. Exploration for base and precious metals is also expected in the Absarokas, the Lake Alice district, the Hartville uplift, the Sierra Madre, and the Medicine Bow Mountains.

During February, the author attended the SME-CMA joint conference in Denver and presented a paper on precious metal deposits in Wyoming to the Colorado Mining Association (CMA) (Hausel, 1991a). A limited number of reprints of the CMA paper are available from the author. The other paper is available from SME as Preprint 91-72.

### Diamond

The Geological Survey of Wyoming's (GSW's) exploration for diamondiferous kimberlite and lamproite will resume this summer under another grant from the University of Wyoming's Mining and Mineral Resource Research Institute. To date the project has revealed more than 100 heavy mineral anomalies in the Laramie Mountains in southeastern Wyoming. The project apparently has attracted the interest of diamond exploration firms around the world. For instance, the GSW has recently been contacted by both a consulting firm and a major mining company about exploration land testing of diamond deposits in the State Line district and elsewhere in Wyoming. Additionally, there are several reports of two other major international mining companies searching large areas in Wyoming for commercial diamond deposits.

The GSW will resume collecting stream-sediment sample concentrates in the Laramie and Medicine Bow Mountains this summer. As part of the research study, the GSW will also look for diamonds in lamproites in the Leucite Hills near Rock Springs.

### Keystone district, Medicine Bow Mountains

The Keystone district in the central Medicine Bow Mountains, was examined by the Geological Survey of Wyoming (GSW) in 1989 and last fall. The GSW's studies concentrated on the Keystone-Florence trend because the owner had requested assistance. The Keystone mine was also recently sampled by Homestake Mining Company.

The Keystone mine operated for a few years in the late 1800s and terminated operations for an unknown reason in 1893 with 6,000 tons of ore on the surface and 10,000 tons of ore still underground. The ore tenor reportedly averaged 1.2 ounces per ton gold (Currey, 1965). The mill was not dismantled until the early 1950s.

Presumably, since very little ore remains on the site today, the material that was stockpiled on the surface was either milled or used in grading a nearby Forest Service road.

The Keystone-Florence trend is a mineralized shear zone traceable for approximately one mile on the surface. The shear cuts across the contact between Keystone Quartz Diorite and chlorite schist and is hosted by both rock types. The structure varies from 2-6 feet wide with local splays up to 300 feet long. Earlier information and recent sampling by the GSW indicate the shear is weakly mineralized along much of its trend with ore shoots at both ends. While actual production from the Keystone and Florence mines is unknown, Currey (1965) estimated production of 5,000 ounces from the Keystone and 2,500 ounces from the Florence.

Samples from the Florence mine somewhat agree with the historic descriptions of the ore described in Currey (1965). The gold ore reportedly occurred in close association with massive pyrrhotite. Two samples collected a short distance northwest of the Florence shaft contained distinct limonite boxworks after pyrrhotite or pyrite. One of the samples was not assayed because it was specimen-grade and contained abundant visible gold (1 mm and smaller flakes). The second sample contained only a trace of visible gold and assayed 45 ppm (1.31 ounces per ton) gold.

The Keystone dump and surrounding exposures have been so thoroughly picked over during the past years that they now show little evidence of ore on the surface. However, two specimens of ore were found on the dump, and they assayed 22 and 2.1 ppm (0.64 and 0.06 ounce per ton) gold, respectively.

**Lake Alice District**

The U.S. Forest service is examining its management strategy in the Lake Alice district in the Overthrust Belt of western Wyoming. It is soliciting comments on the appropriate usage of the area to include the possibility of restricting access. The Lake Alice district hosts a large, red-bed, copper-silver-zinc-lead deposit of potentially enormous tonnage (Boberg, 1984). Boberg (1984) believes this area could easily host a 100-million-ton resource of copper and silver.

**Seminoe Mountains**

The Geological Survey of Wyoming (GSW) will continue field studies in the Seminoe Mountains this summer. A detailed map of the Precambrian rocks in the western portion of the Seminoe Mountains district was completed and published as an open file in March (Hausel, 1991b). This map supersedes an earlier map of the area compiled from previous workers (Hausel, 1989). Mapping on the Seminoe Dam Quadrangle to the east should begin early this summer.

The Seminoe Mountains includes a relatively thick belt (1,000-2,000 feet thick) of ultramafic rocks. These rocks are high in MgO, Cr, and Ni. Banded iron formation forms extensive outcrops in the Seminoe Mountains. Because of the affinity that gold has for iron, these rocks are being sampled for gold and silver.

The GSW initiated a long-term, statewide project last summer to test banded iron formation for precious metals. Considering the importance of gold-bearing banded iron formation elsewhere (i.e., Jardine, Montana; Homestake, South Dakota; and numerous properties in Zimbabwe) and the abundance of iron formation in Wyoming, this project is considered high priority.

Geologically, the Seminoe Mountains represent a relatively young greenstone belt (2.7-2.9 billion years old), with a lower mafic to ultramafic metavolcanic unit having an apparent

thickness of nearly 10,000 feet. The lower unit is overlain by an ultramafic unit with 1,000-2,000 feet of serpentinites and spinifex textured basaltic and peridotitic komatiites. Several hundred feet of banded iron formation, clastic metasediments, felsic metavolcanics, and metagabbro overlie the middle unit. Gold in the greenstone belt occurs in veins associated with pervasive chloritic alteration, sulfides, quartz, and calcite.

**Snowy Range, Medicine Bow Mountains**

The Snowy Range is underlain by one of the more unique successions of Proterozoic rock in the world. According to Hutchison and Viljoen (1988), "only in the late Archean strata of Wyoming USA [*in reference to the Medicine Bow Mountains and the Sierra Madre*] are there believed to be paleoplacer occurrences of the same age as those in the Witwatersrand". Houston and others (1983) further point out that "the Magnolia Formation is of particular interest because it contains radioactive and fluvial conglomerates similar to the Witwatersrand of South Africa and the Blind River of Canada."

This analogy is important. For if the similarities hold, these rocks in the Snowy Range of the Medicine Bow Mountains could host significant mineral resources. It is reported that since the discovery of the Witwatersrand paleoplacers in 1886, they have produced 52% of the gold mined in all of human history. total Witwatersrand gold production is estimated at about 44,650 short tons of gold.

The U.S. Forest Service has proposed the withdrawal of more than 12,000 acres in the Snowy Range from mineral entry. If this action is taken, it would lock up an area with tremendous mineral potential.

Within the area slated for withdrawal, significant gold mineralization was identified by geologists from the U.S. Forest Service and the Geological Survey of Wyoming. Sulfide samples collected from a 100-200 feet wide and 2,000 feet long, limonite-stained shear zone from the Lewis Lake prospect (S/2 S/2 section 8 and N/2 N/2 section 17, T16N, R79W) yielded assays from 0.063-4.8 ppm gold (0.002-0.14 ounce per ton). The average of four samples collected in this sulfide zone was 3.09 ppm (0.09 ounce per ton).

**Southern Wyoming**

The Geological Survey of Wyoming (GSW) has begun collecting information on occurrences of precious metals in southern Wyoming as a prelude to field studies, which are supported in part by a grant from Union Pacific Resources. Several individuals have already contacted the GSW about their precious metals discoveries along or adjacent to the Union Pacific land grant. Some of these discoveries include 1-2 mm rounded gold particles found in sands and sandstones in the middle of a basin and fine gold from sand and gravel deposits.

In order to more easily follow any discovered mineralized trends, the GSW contracted with a mobile-laboratory, which can process samples on site and on the same day they are collected. This procedure will eliminate the typical three to five months delay in obtaining assays through more conventional laboratories.

**South Pass**

The final report on the Geological Survey of Wyoming's six-year study of the South Pass greenstone belt was published in March (Hausel, 1991c). This 129-page report draws analogies to the gold-rich terranes in Western Australia and demonstrates similarities of lithology, age, structure, and mineralization between the two regions. The report includes a 1:48,000-scale map of the greenstone belt, a sample location map, more than 100 whole rock and single element analyses, and more than 24

mine maps. Some of the mines were sampled in detail during the study.

Several important anomalies and significant mineral occurrences were recognized. Anomalous gold, copper, silver, chromium, arsenic, tin, and tungsten were identified. Some of the more interesting occurrences and deposits included channel and chip samples with gold values as high as 1-3 ounces per ton (opt), a copper-silver stockwork, a hidden auriferous shear zone, and broad zones of low-grade gold mineralization.

The report concludes that the South Pass area contains several small, high-grade gold deposits; some large, low-grade gold deposits; extensive banded iron deposits; small gold placers; and some giant low-grade gold paleoplacers. There is also some potential for the discovery of a world-class gold deposit.

After the new South Pass report was published, samples of a serpentinitc deposit located in the Lewiston Lakes granodiorite a short distance east of the South Pass greenstone belt were collected for x-ray diffraction studies and for chromium and nickel analyses. All of the tested samples were serpentinite containing no apparent nickel or chromium anomalies. Two samples of a narrow quartz vein in metagreywacke north of the Lewiston district yielded anomalous gold and silver.

The Atlantic City iron mine located along the northern edge of the South Pass greenstone belt was the object of a recent judicial order. According to the Casper Star-Tribune (March 24, 1991, p. B1), a district judge ruled that the support buildings at the Atlantic City iron mine must be destroyed and removed as part of the mine's reclamation. This ruling is in favor of the Wyoming Department of Environmental Quality (DEQ), which is seeking to have the open pit mine reclaimed.

The Atlantic City iron mine, which was operated from 1962 to 1983 by U.S. Steel Corporation (now USMX), yielded more than 90 million tons of iron ore before mine operations were terminated. The iron ore operations ceased during an economic recession, and closure was apparently due to increased mining and milling costs and also to foreign competition. The mine property was eventually sold to Universal Equipment Company.

In 1968, Bayley reported that indicated iron reserves at the mine site were about 300 million tons (average content approximately 30% Fe). This suggests a substantial ore body remains unmined at the site. Recent mapping by Hausel (1987; 1988) supports Bayley. Because this is a relatively low-grade iron deposit, reclamation could make it economically impossible to recover the remaining reserves, even in the future.

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# Wyoming Agricultural Update

Trade has been an important factor in the outlook for U.S. farm incomes. This fiscal year U.S. agricultural export shipments are lagging behind 1989/90 levels. According to USDA projections, agricultural exports are expected to reach $37 billion in 1990/91, down from $40 billion in 1989/90 (USDA, Agricultural Outlook). This expected drop can be largely blamed on weak prospects for coarse grain sales.

Grain shipments to the Soviets dropped 82 percent in October through December 1990 compared to a year earlier. Exports to the Soviets are difficult to predict for the coming year due to questions regarding the strength of the Soviet economy and their ability to pay for imported products. Sales to the Soviets accounted for more than 7 percent of U.S. agricultural exports in 1989/90. Back-to-back record grain crops in China have reduced China's imports of U.S. wheat by about half. In addition, China's corn exports are replacing U.S. sales in east and southeast Asia.

The U.S./European Community (EC) trade relationship has been a focus of the General Agreement on Tariffs and Trade (GATT) talks. European community policies have encouraged domestic production, displacing U.S. imports. The EC has moved from a net importer to a net exporter of many grain and livestock products. Grains and oilseeds are the most important component of U.S. agricultural sales to the EC. Combined, they accounted for over half the U.S. agricultural exports to the EC in 1989/90. Even so, the sales of these products declined during the 1980s. Exports of oilseeds are 61% below that of 1982 and grains and feeds exports are less than half that of 1982 (USDA, Agricultural Outlook). Although the U.S. and the EC have failed to reach a compromise position in the GATT negotiations so far, there is some hope remaining that they may be able to do so. The U.S. and the EC clearly favor different approaches to trade liberalization, but both wish to reduce trade frictions. However, failure to reach an agreement could prompt many nations to raise barriers to trade, reducing trade flows and depressing prices (USDA Agricultural Outlook).

## GRAINS OVERVIEW

USDA analysts estimate world wheat production in 1990/91 at a record 589 million tons, while world wheat consumption is forecast to be 527 million tons. As a result, world wheat stocks are expected to expand 13 percent. Most of this increase in stocks will be in the major foreign exporting countries. Large crops in both importing and exporting countries will lead to a contraction in imports and a small, more competitive world wheat market. USDA sources estimate world wheat trade will be at 93.7 million tons, 2 percent below 1989/90 levels.

Wheat imports to the Soviet Union, China and south Asian countries are expected to be down during 1990/91. Bright spots in terms of increased wheat imports are north Africa and Latin America, where importing countries are taking advantage of the low wheat prices to provide a low-cost source of calories, and east Asia where wheat imports are expected to increase for use in animal feeding (USDA, Wheat Situation and Outlook).

USDA analysts estimate U.S. wheat plantings to be 69.0 million acres in 1991. This is well below plantings of 77.3 million acres in 1990 and 76.6 million acres in 1989. Declines are expected in all major wheat producing regions with the exception of Washington. This decline in wheat plantings is due to a larger

Wheat Acreage Reduction Program under the new farm bill and low expected wheat prices.

U.S. wheat production was a near-record 2.74 billion bushels in 1990. Even though beginning stocks were relatively low, the forecast total supply for 1991 is 3.3 billion bushels, the largest since 1986/87. As previously mentioned, this large U.S. crop coincides with large crops in other countries, leading to weak U.S. export prospects. As a result, USDA analysts predict that U.S. wheat prices should rest near the loan rate in the $2.55-$2.65 per bushel range (USDA, Wheat Situation and Outlook).

USDA analysts forecast the 1990/91 world production of coarse grains to be 826 million tons, the highest level in four years. World consumption is forecast to decline marginally from last year's record. Thus, a 14 percent decline in world trade is projected for 1990/91. The largest factor in this trade decline is the large drop in projected imports by the Soviet Union. USDA analysts expect U.S. corn exports to fall 21 percent from last year. U.S. sales to the Soviet Union, Japan, South Korea and Mexico have declined due mainly to larger domestic crops and Chinese exports (USDA, Feed Situation and Outlook).

USDA analysts expect feed grain acreage in the U.S. to be up by about 2 percent in 1991. Corn, sorghum and barley plantings are all expected to increase this year. Increased acreage is a response to relatively steady prices and lower Acreage Reduction Program requirements. Reduced exports, coupled with somewhat higher expected production, suggest somewhat lower prices. The corn price is forecast at $2.20 to $2.40/bushel for the remainder of 1991. Barley prices are forecast to be $2.10 to $2.30/bushel. Oat prices are forecast to be lower at $1.10 to $1.20 this fall (USDA, Feed Situation and Outlook).

## LIVESTOCK OVERVIEW

The current modest expansion of the cattle herd is expected to continue through 1991 and perhaps through the mid 1990s. The current cattle and calf inventory is about 1 percent above the year earlier level. Cattle on feed were up 8 percent from a year earlier, indicating greater cattle slaughter through 1991 (USDA, Livestock and Poultry Situation and Outlook). USDA analysts expect beef production to rise by 1 to 2 percent in 1991. Prices for fed cattle are expected to average in the mid to high $70 range during 1991. Prices will weaken some during the summer, but strengthen through late fall.

Low grain prices and continued high fed cattle prices should continue to support feeder cattle prices for the next year. Expect prices in the high $80s and low $90s through 1991. USDA analysts project retail beef price increases to moderate after 1990's record increases (USDA, Livestock and Poultry Situation and Outlook).

The sheep and lamb inventory has declined about 1 percent from 1990 levels. This decline signals the end of the expansion phase of the lamb cycle that started in 1986. This reduction is due to the relatively low returns sheep producers received during 1990. Lamb production is expected to be up slightly during 1991. This increase, in the face of lower prices, is due to increased lambing rates. The USDA forecasts slaughter lamb prices to be in the low $50s for the last half of 1991 (USDA, Livestock and Poultry Situation and Outlook).

Developments in the world wool markets will have a detrimental impact on U.S. wool prices. Faced by a 13 percent increase in sheep inventories over the past several years, all-time high Australian Wool Corporation (AWC) wool stocks of 4.6 million bales, wool prices which have fallen by 50 percent in the last year and low lamb and mutton prices, the Australian Wool Corporation suspended its Reserve Price Scheme (RPS) and instituted a program to reduce the size of the flock (USDA, Agricultural Outlook).

AWC targets call for flock reductions of 20 million head. The incentive to participate is

provided by a payment to producers of $AUS 1.80 per sheep killed and disposed of in on-farm or community pits, or rendered. The flock reduction is financed through the AWC's Market Support Fund which is funded by compulsory taxes on producers. More then 840,000 sheep have been certified killed under the program so far (USDA, Agricultural Outlook). Australia traditionally supplies 60 percent of the world's fine wool trade. As a result, the AWC's Reserve Price Scheme has served as a world floor price for fine wool since its implementation 17 years ago. Thus, the suspension of the RPS has important implications for wool exporting and wool importing countries.

Other major wool producing countries have been affected. The New Zealand Wool Board (NZWB) followed the AWC's lead by suspending its income support program for farmers and its wool buying program. The current wool crisis leaves the NZWB with relatively large stocks of low-valued wool. The South African Wool Board has so far maintained its marketing program, but will have to go to the government for supplemental funding if the program is to be implemented.

U.S. wool producers received lower wool prices when their wool came to market in March and April. However, these lower revenues will be mitigated somewhat by the incentive payments which provide income support to producers. Even so, world and thus U.S. wool prices are likely to remain depressed until Australia and New Zealand are able to dispose of their wool stocks. USDA estimates that this could take 5 years (USDA, Agricultural Outlook).

Australian sheep producers are bearing the brunt of low lamb and wool prices in Australia. However, the suspension of the RPS for wool and the flock reduction scheme should help correct the imbalance in world supply and demand for sheep products. The Australian example illustrates how a domestic policy can distort a world commodity market, leading to unintended domestic consequences (USDA, Agricultural Outlook).

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# Job Openings Outlook

## TRAVEL AGENTS

Travel agents provide travel information, help plan trips, and make travel arrangements which meet their clients' budgets, interests, and time. They use timetables, travel manuals, computers and rate books to plan routes, compute ticket costs, verify arrival and departure times, and seating space. They may arrange for accommodations and tours, and advise clients on where to travel and what to see based on their knowledge and their clients' wishes. Some specialize in domestic or international travel.

Travel agents must work well with people, be patient, and communicate information accurately. Agents must be able to keep up with frequent changes that occur in travel schedules, work with details, know how to read and interpret travel schedules and rate books, be persuasive, and do several things at one time. A knowledge of immigration laws, foreign currency and customs regulations are important as well as being able to compute costs and write tickets. Since travel agencies are becoming increasingly computerized, experience with electronic data processing equipment may also be a necessity in the near future. Also, one or two years of related college work and/or completion of travel training program is preferred by most employers.

The work setting of a travel agent depends on the size and location of the employer. In small offices, travel agents may do a variety of duties such as typing itineraries or estimating costs that clerical staffs handle in larger establishments. Most of an agent's time is spent at a desk talking with customers, making travel arrangements, and doing necessary paperwork. One of the fringe benefits of being a travel agent is the opportunity to travel and to get to know resorts and foreign cities. However, very little of the agent's time is actually spent traveling.

A travel agent's wages depend on size of agency, sales ability, and experience. During training, wages are around $8,400 per year. Wages after training are around $9,300-10,200 per year. Average maximum wage with experience is between $14,500-19,600 per year. Some travel agents, depending on employer, work on a commission basis. Commissions range between 10-20 percent. Nationally, wages are slightly higher. Beginning travel agents may start at approximately $12,000 per year and increase to $21,000 per year with experience. Managers' salaries average $30,000 per year.

Currently, there is a slight shortage of qualified applicants in most areas of the state. Employment opportunities for travel agents depend on availability of training programs, availability of low cost travel service, the number of qualified workers moving in or out of the state, the state of the economy, and increased automation, and leisure time. Studies predict steady demand; however, competition is keen due to the extremely low turnover rates and popularity of jobs in the travel industry. Nationally, employment of travel agents is expected to grow faster than the average for all occupations through the year 2000. Many job openings will arise as new agencies open and existing agencies expand. Most openings will occur due to experienced agents leaving the occupation or labor force.

## FRONT DESK CLERKS

Front desk clerks register guests and assign rooms in hotels and motels. They reserve rooms, issue keys, and collect payments. In small hotels and motels, clerks have many tasks which include simple bookkeeping, processing mail, and operating switchboards. In larger establishments, they may handle one specific job. For example, room or desk clerks assign rooms and answer questions about hotel services

and checkout times. Reservation clerks record written or telephoned requests for rooms, prepare registration forms, and notify other clerks of guests' arrival.

Front desk clerks must be able to operate cash registers, take reservations, and check guests in and out of the motel/hotel. They must be able to keep accurate records, type, operate a switchboard and possibly operate a computerized reservation system. Front desk clerks also need to be able to make mathematical calculations and to check details on documents such as bills and credit slips. These aptitudes make eye-hand coordination and finger dexterity important also. Potential employees will have an advantage over other applicants if they are able to catch on to things easily, communicate well with customers, illustrate patience, and have a friendly, courteous manner with people. Finally, although education beyond high school is not required, college training is an asset for promotion into managerial jobs.

Front desk clerks work indoors in usually clean, comfortable, and well lighted surroundings. While the work is not physically strenuous, most duties require long periods of standing. Work schedules may include evenings, weekends, and holidays and shifts may be rotated. During peak registration and checkout periods, clerks work under pressure in order to satisfy the different needs of guests. Teamwork is extremely important for quality front office work. Clerks must work cooperatively with other employees to serve guests properly.

This medium-sized occupation in Wyoming employs about 670. Many Wyoming motels are small family operated businesses. Front desk duties are often handled by owner-managers. Some belong to the Hotel and Restaurant Employees and Bartenders International Union.

Most front desk clerks' starting salary is between $4.25-4.75 per hour. Top wages range between $5.00-6.23 per hour, depending on experience and length of service. Nationally, average annual earnings for full-time front desk clerks are about $11,700 per year. The majority earn between $9,900 and $14,600 per year.

In Wyoming, there is a slight shortage of qualified applicants. Employers usually hire high school graduates who have some clerical skills. However, as the pool of younger workers shrinks the problems of finding and keeping staff is expected to become worse. Hotels are offering more jobs to older persons and part-time workers and are trying to keep new applicants with recruitment and retention programs. Women make up more than half of the employees in the hotel and motel industry. The number of people employed in this occupation is less affected by economic conditions than is employment is other motel and hotel occupations. Those who are willing to work evening and night shifts improve their chances for employment. Nationally, employment is expected to grow faster than the average for all occupations through the year 2000 due to building of new hotels and motels and an expected increase in business travel.

Preparation for entry into this occupation usually occurs on the job. Training is usually three to four weeks in length and includes an explanation about the hotel, such as room locations and services offered. Some clerks may need additional training in data processing or office machine operations because of the increased use of computerized reservation systems. Finally, some hotels/motels follow a policy of promoting employees from within to positions as front desk clerks, which, in time, may lead to managerial positions. However, college training is becoming increasingly important for promotion to managerial jobs.

Kay Briggs
Coordinator
Wyoming Career Information Systems

# 1990 Census: Selected Population and Housing Characteristics for Wyoming

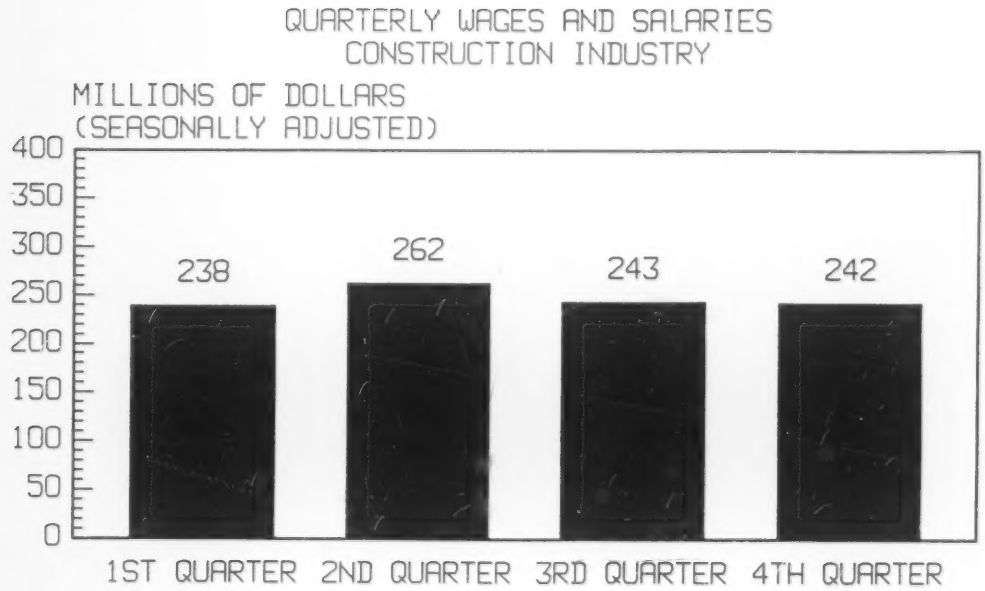
| | |
|---|---|
| **Total Population** | 453,588 |
| SEX | |
| Male | 227,007 |
| Female | 226,581 |
| AGE | |
| Under 5 years | 34,780 |
| 5 to 17 years | 100,745 |
| 18 to 20 years | 20,025 |
| 21 to 24 years | 21,361 |
| 25 to 44 years | 148,495 |
| 45 to 54 years | 45,497 |
| 55 to 59 years | 17,893 |
| 60 to 64 years | 17,597 |
| 65 to 74 years | 27,759 |
| 75 to 84 years | 14,886 |
| 85 years and older | 4,550 |
| Median age | 32.0 |
| Under 18 years | 135,525 |
| % of total popu. | 29.9 |
| 65 years and over | 47,195 |
| % of total popu. | 10.4 |
| HOUSEHOLDS BY TYPE | |
| Total Household | 168,839 |
| Family Household (families) | 119,825 |
| Married-couple Household | 100,800 |
| % of total | 59.7 |
| Male householder | 5,035 |
| Female householder | 13,990 |
| Nonfamily Household | 49,014 |
| % of total | 29.0 |
| Householder living alone | 41,287 |
| Householder 65+ | 14,431 |
| Persons living in Household | 443,348 |
| Persons per Household | 2.63 |
| GROUP QUARTERS | |
| Persons living in group quarters | 10,240 |
| Institutionalized | 5,434 |
| Others | 4,806 |
| RACE AND HISPANIC ORIGIN | |
| White | 427,061 |
| Black | 3,605 |
| % of total | 0.8 |
| Am. Indian/Eskimo/Aleut | 9,479 |
| % of total | 2.1 |
| Asian/Pacific Islander | 2,806 |
| % of total | 0.6 |
| Other race | 10,636 |
| Hispanic origin | 25,751 |
| % of total | 5.7 |

| | |
|---|---|
| **Total housing units** | 203,411 |
| OCCUPANCY AND TENURE | |
| Occupied housing unit | 168,839 |
| Owner occupied | 114,544 |
| % owner occupied | 67.8 |
| Renter occupied | 54,295 |
| Vacant units | 34,572 |
| Seasonal/Recreation | 9,468 |
| Homeowner vacancy rate | 3.9 |
| Rental vacancy rate | 14.4 |
| Persons per owner occupied | 2.74 |
| Persons per renter occupied | 2.39 |
| Units w/1+ per room | 4,702 |
| UNITS IN STRUCTURE | |
| 1-unit, detached | 129,197 |
| 1-unit, attached | 6,212 |
| 2-4 units | 15,645 |
| 5-9 units | 6,084 |
| 10+ units | 10,418 |
| Mobile home/trailer | 35,855 |
| VALUE | |
| Specified owner occupied units | 78,414 |
| Less than $50,000 | 25,854 |
| $50,000-$99,999 | 43,796 |
| $100,000-$149,999 | 6,243 |
| $150,000-$199,999 | 1,473 |
| $200,000-$299,999 | 680 |
| $300,000+ | 368 |
| Median (dollars) | 61,600 |
| CONTRACT RENT | |
| Renter occupied units-cash rent | 46,728 |
| Less than $250 | 20,012 |
| $250-$499 | 24,085 |
| $500-$749 | 2,368 |
| $750-$999 | 165 |
| $1,000+ | 98 |
| Median (dollars) | 270 |
| RACE/HISPANIC ORIGIN OF HOUSEHOLDER | |
| Occupied units | 168,839 |
| White | 160,879 |
| Black | 1,208 |
| % of total | 0.7 |
| Am.Indian/Eskimo/Aleut | 2,630 |
| % of total | 1.6 |
| Asian/Pacific Islander | 772 |
| % of total | 0.5 |
| Other race | 3,350 |
| Hispanic origin | 7,662 |
| % of total | 4.5 |

# FYI

Census data released thus far is subject to possible corrections for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts. Proposed corrected counts appear below. Corrected counts must be published no later than July 15, 1991.

| State | Census | Corrected | Percent |
|---|---|---|---|
| Alabama | 4,040,587 | 4,146,000 | 2.5 |
| Alaska | 550,043 | 561,000 | 2.0 |
| Arizona | 3,665,228 | 3,790,000 | 3.3 |
| Arkansas | 2,350,725 | 2,403,000 | 2.2 |
| California | 29,760,021 | 30,888,000 | 3.7 |
| Colorado | 3,294,394 | 3,376,000 | 2.4 |
| Connecticut | 3,287,116 | 3,306,000 | 0.6 |
| Delaware | 666,168 | 687,000 | 3.0 |
| D.C. | 606,900 | 639,000 | 5.0 |
| Florida | 12,937,926 | 13,278,000 | 2.6 |
| Georgia | 6,478,216 | 6,633,000 | 2.3 |
| Hawaii | 1,108,229 | 1,136,000 | 2.4 |
| Idaho | 1,006,749 | 1,035,000 | 2.7 |
| Illinois | 11,430,602 | 11,592,000 | 1.4 |
| Indiana | 5,544,159 | 5,586,000 | 0.7 |
| Iowa | 2,776,755 | 2,807,000 | 1.1 |
| Kansas | 2,477,574 | 2,506,000 | 1.1 |
| Kentucky | 3,685,296 | 3,768,000 | 2.2 |
| Louisiana | 4,219,973 | 4,332,000 | 2.6 |
| Maine | 1,227,928 | 1,240,000 | 1.0 |
| Maryland | 4,781,468 | 4,869,000 | 1.8 |
| Massachusetts | 6,016,425 | 6,039,000 | 0.4 |
| Michigan | 9,295,297 | 9,404,000 | 1.2 |
| Minnesota | 4,375,099 | 4,419,000 | 1.0 |
| Mississippi | 2,573,216 | 2,632,000 | 2.2 |
| Missouri | 5,117,073 | 5,184,000 | 1.3 |
| Montana | 799,065 | 822,000 | 2.8 |
| Nebraska | 1,578,385 | 1,595,000 | 1.0 |
| Nevada | 1,201,833 | 1,232,000 | 2.4 |
| New Hampshire | 1,109,252 | 1,116,000 | 0.6 |
| New Jersey | 7,730,188 | 7,836,000 | 1.4 |
| New Mexico | 1,515,069 | 1,586,000 | 4.5 |
| New York | 17,990,455 | 18,304,000 | 1.7 |
| North Carolina | 6,628,637 | 6,815,000 | 2.7 |
| North Dakota | 638,800 | 648,000 | 1.4 |
| Ohio | 10,847,115 | 10,933,000 | 0.8 |
| Oklahoma | 3,145,585 | 3,214,000 | 2.1 |
| Oregon | 2,842,321 | 2,898,000 | 1.9 |
| Pennsylvania | 11,881,643 | 11,957,000 | 0.6 |
| Rhode Island | 1,003,464 | 1,006,000 | 0.3 |
| South Carolina | 3,486,703 | 3,590,000 | 2.9 |
| South Dakota | 696,004 | 707,000 | 1.6 |
| Tennessee | 4,877,185 | 5,012,000 | 2.7 |
| Texas | 16,986,510 | 17,551,000 | 3.2 |
| Utah | 1,722,850 | 1,757,000 | 1.9 |
| Vermont | 562,758 | 571,000 | 1.4 |
| Virginia | 6,187,358 | 6,353,000 | 2.6 |
| Washington | 4,866,692 | 4,987,000 | 2.4 |
| West Virginia | 1,793,477 | 1,842,000 | 2.6 |
| Wisconsin | 4,891,769 | 4,924,000 | 0.7 |
| Wyoming | 453,588 | 466,000 | 2.7 |
| United States | 248,709,873 | 253,987,000 | 2.1 |




SOURCE: BUREAU OF ECONOMIC ANALYSIS
APRIL 1991

# Tourism And Its Impact On The Wyoming Economy

Travel in Wyoming supported a large and still growing industry in Wyoming as the Cowboy State celebrated its centennial in 1990.

Total dollar expenditures by tourists in Wyoming is estimated to be $1,432,296,736. These figures are provided by Davidson-Peterson Associates, a tourism research firm headquartered in York, Maine, as part of an economic measurement contract with the Division of Tourism, Wyoming Department of Commerce. This is the second year of the Davidson-Peterson economic impact report for Wyoming.

The 1990 figures represent a growth of 1.65 percent over revised 1989 figures. The '89 numbers were revised downward to $1,409,000,000 because of two major factors: Better and more complete survey techniques in 1990 and reduction of the "visiting friends and relatives" category in the '89 numbers. We expected the revision and are totally comfortable with the new numbers as we got started late in 1989 and knew that our data would be significantly better in 1990.

A point here about measuring tourism. It's an inexact science, at best. If you have 50 people doing tourism research, you're likely to get 50 different responses. Why is that?

The tourism industry is made up of a diverse cross-section of small businesses and, unlike the oil and gas industry or the agriculture industry, it is extremely difficult to get a precise handle on just what we are measuring. We don't have a barrel of oil or a steer or a bushel of wheat to measure. We have tourist expenditures at lodging, eating and retail establishments and measuring that is not as precise as we would like.

The Davidson-Peterson impact model uses a "bottoms-up" measurement as opposed to the traditional "top-down" or industry-receipts measurement. In the latter we assume an industry is composed of a set of businesses that are clearly designated by some code (often SIC Code). For most industries this works well.

As noted, however, the tourism industry is not typical. Tourism cannot be measured by a few SIC classified businesses. Tourism is the movement of people into an area for a brief period of time, and its economic impact begins with the sum of every dollar these visitors spend. Whether they are spent on hotel rooms, meals, admissions or whether they are spent on retail purchases, medical services or any other goods and services people buy does not matter. The Davidson-Peterson measurement believes the bottom-up procedure that begins with everything tourists spend is more representative of the impact.

Hey, we recognize that not everyone will agree with this method, but it has worked for several other states and countries and it does provide a basis for measurement. We will continue to improve the vehicle each year.

To cases. Here are the 1990 figures and what they meant to the Wyoming economy. The $1,432,296,736 expenditure total broke down as follows by season:

| | |
|---|---|
| January-May | $349,819,144 |
| June-August | $748,472,810 |
| September-December | $334,004,782 |

We started strong in 1990. During the January-May period tourist expenditures exhibited strong growth, increasing 7.6 percent over the same period in 1989. The Jackson

Hole ski areas reported record seasons and the snowmobile industry gained in strength.

During the summer months (June-August) the growth continued but at a somewhat lower rate of growth--4 percent. Interestingly, many of our key indicators--visitation at Yellowstone and Grand Teton national parks and Devils Tower national monument and ticket sales at Cheyenne Frontier Days--were up 7 to 8 percent over the same period. Why the difference? We believe two factors were at play: Lodging rates remained status quo or even slightly lower than '89, thus the impact was defused, and we saw increased regional visitation in 1990. Visitation from surrounding states has been increasing dramatically and these visitors don't stay as long. They may, however, visit three or more times during a year, thus spreading out their impact.

The period September-December really hurt. Tourism expenditures for this period dipped by more than 8.3 percent over '89. This decline was fueled by poor weather at the start of the ski season and a reduction in business done by ranches. The net of these seasonal changes was the overall 1.65 percent gain for 1990.

The 1990 figures resulted in economic impact as follows:

| | 1990 | '90 vs 89 |
|---|---|---|
| Total Full Time Equivalents | 26,005 | -2.8% |
| Total Personal Income (Thousands) | $534,247 | +1.4% |
| State Tax Revenues (Thousands) | $126,042 | +.4% |
| Local Tax Revenues (Thousands) | $48,698 | +2.5% |

More than half the $1.432 billion expenditures are by hotel/motel resort guests ($810.98 million or 57 percent) while much less was contributed by those participating in dude ranch or outfitter packages ($31.01 million or 2 percent).

Estimated tourist expenditures are highest for food ($354.42 million) and lodging ($228.15 million) with less on ground transportation ($196.58 million) and shopping ($194.15 million). However, when general shopping and buying clothes are combined, the result ($335 million) places total retail in strong second place behind food but ahead of lodging.

The Jackson Hole/Jim Bridger Country (Lincoln, Sublette and Teton counties plus Old Faithful and Grant Village in Yellowstone National Park and Hamilton Stores in those areas) had the highest share of tourist expenditures among the regions in 1990 with $467 million or one third of the total (33 percent).

The Medicine Bow/Flaming Gorge Country (Albany, Carbon, Laramie, Sweetwater and Uinta counties) had $380 million. Devils Tower/Buffalo Bill Country (Big Horn, Campbell, Crook, Hot Springs, Johnson, Park, Sheridan, Washakie and Weston counties plus Mammoth, Canyon, Roosevelt and Lake in Yellowstone and the Hamilton Stores in those areas) accounted for $375 million. Oregon Trail/Rendezvous Country (Converse, Fremont, Goshen, Natrona, Niobrara and Platte counties) accounted for the balance of $210 million.

From 1989 to 1990 two regions showed growth. Devils Tower/Buffalo Bill Country and Jackson Hole/Jim Bridger Country had higher expenditures in 1990 by 5.1 percent and 3.9 percent respectively. Medicine Bow/Flaming Gorge Country showed negligible change for the period. Oregon Trail/Rendezvous Country dropped by 4.6 percent from 1989 expenditures.

State tax receipts derived from estimated total tourist expenditures in 1990 were substantial. Tourist expenditures in 1990 led

directly to the receipt of $95.96 million in the state tax coffers. When the indirect effects of tourist expenditures are added, the total state tax collections rise to $126.04 million.

Local jurisdictions received $34.38 million in 1990 as a direct result of tourist spending. When indirect effects are added, the figure jumps to 48.70 million.

A re-cap of the Davidson-Peterson report on the lodging industry notes the following:

--For hotels/motels/resorts, occupancy (59 percent) and room rates ($45.98/double) show little change from 1989 to 1990.

The largest travel party occurs in the summer season, while the longest length of stay is in the fall.

Most guests are from other states in the U.S., staying for business or pleasure.

Estimated visitors staying in hotels/motels/resorts in Wyoming are nearly 5 million--up 3.7 percent over 1989.

--While the average unit rate for cottages/condominiums/cabins declined slightly in 1990, occupancy is up over 1989.

Guests staying in cottages/condominiums/cabins on average, travel in parties of 3.6 persons and stay in Wyoming for about three nights.

The vast majority of guests are pleasure travelers from outside Wyoming.

In 1990, fewer visitors stayed in cottages/condominiums/cabins than in 1989.

--For campgrounds, occupancy and site rates have both increased.

While summer has the highest occupancy, travel party size and length of stay are slightly higher in the fall.

Most campers overall are from states other than Wyoming.

Campers in 1990 are estimated at nearly 2 million, an increase of about 4.0 percent over 1989.

--Although the average daily rate for dude ranches softened in 1990, occupancy was slightly higher. However, the number of room nights available was greatly reduced.

Average travel party size and length of stay is somewhat higher than for guests staying in other paid accommodations.

The majority of guests are from out of state, with the summer season having the highest share of out of state visitors.

An estimated 30,299 visitors stayed at dude ranches in Wyoming, many fewer than in 1989.

--As with guests at dude ranches, visitors using outfitters usually have larger travel parties and lengthier stays in Wyoming

Not surprisingly, those staying with outfitters are nearly all from outside Wyoming.

More visitors to Wyoming in 1990 stayed with outfitters. The estimated 8,475 visitors in 1990 staying with outfitters was a 14 percent increase over 1989.

Again, we acknowledge there are any number of approaches to economic impact research, but the Davidson-Peterson model is a good start to providing the accountability we need. Thanks to improved data gathering procedures by Mike Morey and Associates, Jackson, and improvements in the model, the numbers will only get better and the information more accurate and meaningful.

Gene Bryan
Administrator
Wyoming Division of Tourism

Wyoming Traveler Expenditures by County
1990 vs. 1989
($ Millions)

| | 1989 | 1990 |
|---|---|---|
| Region 1 | | |
| Albany | 56.46 | 58.94 |
| Carbon | 52.58 | 55.68 |
| Laramie | 139.67 | 137.75 |
| Sweetwater | 89.10 | 88.03 |
| Uinta | 44.10 | 39.11 |
| Region 1 Subtotal | 381.91 | 379.51 |
| Region 2 | | |
| Converse | 21.38 | 19.85 |
| Fremont | 53.27 | 52.12 |
| Goshen | 12.03 | 12.18 |
| Natrona | 106.99 | 101.33 |
| Niobrara | 7.09 | 6.97 |
| Platte | 19.95 | 18.08 |
| Region 2 Subtotal | 220.71 | 210.51 |
| Region 3 | | |
| Big Horn | 14.70 | 15.99 |
| Campbell | 56.55 | 54.92 |
| Crook | 14.69 | 15.51 |
| Hot Springs | 15.83 | 16.02 |
| Johnson | 26.21 | 25.41 |
| Park | 153.22 | 168.14 |
| Sheridan | 43.53 | 45.47 |
| Washakie | 14.81 | 15.87 |
| Weston | 17.04 | 17.51 |
| Region 3 Subtotal | 356.59 | 374.83 |
| Region 4 | | |
| Lincoln | 20.65 | 20.81 |
| Sublette | 15.71 | 18.09 |
| Teton | 413.50 | 428.54 |
| Region 4 Subtotal | 449.87 | 467.44 |
| WYOMING TOTAL | 1409.08 | 1432.30 |

# Wyoming Gross State Product Report

## INTRODUCTION

The Department of Administration and Information, Division of Economic Analysis, has completed the 1988 Gross State Product (GSP) report. This report contains detailed GSP data for both major industrial sectors and selected subsector classifications within each sector, from 1960 through 1988. Due to a revision process undertaken by the Bureau of Economic Analysis (source of national data necessary to estimate GSP), no report has been published since 1988. The estimates contained in this report include the most recent revisions to the national product data series (1977-1988).

Gross state product is a measure of goods and services produced in a state over a one year period. GSP estimates, over time, permit the analysis of movements in economic aggregates and structure within a state. Additionally, GSP estimates are useful in many areas, such as the analysis of economic growth by industry, in the formulation of public policies, to analyze impact of public policies, in productivity projections, and in projecting revenue and sales.

## METHODOLOGY

The Wyoming GSP model utilizes a technique developed in the mid-1960's by John W. Kendrick and C. Milton Jaycox[1]. This method, known as the Kendrick-Jaycox (KJ) method, utilizes data published by the federal government[2]; specifically, national income and product account data, and national and state income data. State GSP estimates are developed using a series of national expansion ratios. This technique has proven to be an acceptable and reasonably accurate means of estimating GSP. As with any data model, consistency in concept, estimation, and data are necessary for the end product to be of practical use. The complete Wyoming GSP data series has been developed using the KJ technique.

GSP estimates are comprised of three major divisions of the economy: 1.) Industrial (private non-farm), 2.) Government, and 3.) Farm (see Figure 1). The gross industrial product (GIP) was estimated from the portion of personal income originating in current production, by industry group, expanded by the national ratios of gross product in each group by component (see Figure 2). The formula is as follows:

$$(GP_n/YR_n)YR_s = GP_s$$

where:

$GP_n$ = gross product in industry (national)
$YR_n$ = civilian income received in industry (national)
$YR_s$ = civilian income received in industry (state)
$GP_s$ = gross product in industry (state)

The gross government product (GGP) consists of compensation received by general government employees. Compensation includes wages and salaries, and supplements to wages and salaries. The supplements to wages and salaries, which include items such as state contributions to retirement, and other "fringe" benefits, are available only at the national level. Therefore, the ratio of supplements to wage and salaries at the national level is factored into the state level wage and salary data to arrive at the gross government product. The gross farm product (GFP) was estimated using data obtained from the U.S. Department of Agriculture, Agricultural Statistics Service[3]. Farm income, cash receipts, and expenditure data are available

on an annual basis. The GFP estimates reflect the value added by Wyoming farms to the state economy. Specifically, GFP is the difference between the value of total farm output and intermediate production expenses. It is important to note that the GFP accounts for only the value added by Wyoming farms and ranches; it does not include related businesses such as services, processing, or transportation. These are included in the other sectors of the gross industrial product estimates.

The GSP estimates are provided in both current and constant (1982) dollars (see Tables 1-4). Constant dollar estimates involve deflating the current dollar value of gross output by the GNP Implicit Price Deflator (1982=100) computed by the Department of Commerce. State price indices by industry would have yielded a more precise result. However, this type of information on state price movements was not available at the time this report was produced. The constant dollar estimates, using "deflation", eliminate the effects of price changes attributable to inflation.

## ASSUMPTIONS AND PROBLEMS

The KJ method of estimating gross state product is based on several theoretical principles. This procedure assumes that the structure within each private non-farm industrial sector, at the state level, is sufficiently similar to that at the national level, or that divergences are offsetting. On this premise, the national expansion ratio of gross product to income received is applicable. In general, this implies that similar proportions of land, labor, and capital are used at both the state and national levels, for comparable industries. Additionally, the KJ method assumes that sector productivity (output per dollar investment of labor or capital) is similar between the national and state levels.

Aside from the aforementioned assumptions, however, this procedure does take into account the unique composition of industry in Wyoming. Gross product for each industrial sector and subsector is estimated through the application of national coefficients by industry. The application of expansion ratios by industry type reduces the distortion that would be created if other means, such as a global ratio for the entire sector, were used. Therefore, distortion in the Wyoming GSP estimates, due to significant difference between state and national industrial composition, is substantially reduced.

## SUMMARY

The Wyoming economy has been, and continues to be, driven by three principal components: 1.) mineral resources, 2.) tourism, and 3.) agriculture. The importance of tourism and agriculture is not directly measurable within the GSP estimates at the sector level, because these components are comprised of a wide array of industries dispersed within the various sectors of the gross state product estimate. For example, the transportation of agricultural goods would be accounted for in the transportation, communication, and public utilities sector under the trucking and warehousing component.

Historically (from 1960 forward), gross state product had made steady to significant annual gains through 1981 (see Figure 3; see also Tables 5-6). In 1982, the state economy commenced to decline gradually, following several years of augmented mineral activity (1979-1981). Wyoming's GSP hovered around the $9 billion mark for the next three years (1983-1985). The ensuing two years (1986-1987) showed decline, resulting primarily from subsidence within the mineral sector.

The estimated gross state product for 1988, at $8.4 billion, was up nearly 3% from the 1987 level. This marked the first year, after three consecutive years of steady decline, that the state's GSP showed improvement. The U.S. gross national product for that same period increased almost 8%.

## GROSS INDUSTRIAL PRODUCT

The gross industrial product (GIP) share of the total 1988 GSP, at 78.5%, was off 0.3%

from its contribution a year earlier (see Tables 7-8). Although nominal, this shift in the GIP share was due to increases in the other two divisions of the gross state product. However, when comparing levels between the two years, the 1988 GIP was up $156 million, or 2.4% from 1987.

The mining sector, after 6 consecutive years of decline, was up 2.1% from a year earlier, totalling nearly $1.8 billion. This sector includes all establishments engaged in the extraction of minerals occurring naturally, as well as those engaged in well operations, quarrying, milling and other preparation done at the mine site. All components, with the exception of oil and gas extraction, realized notable improvement. The largest increase, at 16.0% over the 1987 level, was in the metal mining component. Coal mining and non-metallic minerals (excluding fuels) realized increases of 7.0% and 8.9%, respectively, over 1987 levels. The mining sector in 1988, at 27.3% of the total GIP, was off 0.1% from the 1987 share of the total GIP. Mining continues to be the dominating sector in both the GIP, and the total GSP.

The transportation, communication, and public utilities (TCPU) sector realized a 5.5% gain over 1987. The TCPU sector total, at nearly $1.3 billion, made up 19% of the GIP. This sector includes establishments that provide passenger and freight transportation, communications services, electricity, gas, steam, water or sanitary services, and federal postal service to the general public. The major transportation components, railroad transportation, and trucking and warehousing, posted notable gains of 4.7% and 8.1%, respectively, over the 1987 levels. The transportation by air component was up 16.3% from a year earlier. Pipeline activity (excluding natural gas) increased nearly 2% from 1987. The public utilities component (electric, gas, and sanitary services) realized a 6.2% increase over 1987, while the communications component showed a nominal annual increase of 0.2%. The TCPU sector remained the second most significant sector in the GIP category.

The services sector, at 15% of the GIP total, was the third most significant sector. All components, except the private households and business services components, realized increases over 1987 levels. The miscellaneous repair service component showed the most significant improvement from 1987 of nearly 24%. The miscellaneous repair services group includes establishments such as electrical repair shops, watch and jewelry repair, reupholstery and furniture repair, and a wide variety of services not classified elsewhere. The educational services component realized the second most significant increase in this sector, rising 17.0% from the 1987 level. This group includes establishments providing academic or technical instruction such as elementary and secondary schools, colleges and universities, libraries, and vocational schools. The third most significant increase in this sector, at 13.4%, was realized in the automobile repair, services, and garages component. The next largest gain over 1987 was seen in the amusement, and recreation services component, at 12.1%. This major group of services includes dance studios, theatrical producers (except motion pictures), bowling centers, commercial sports, physical fitness facilities, and golf courses. The other services components realizing notable increases over 1987 levels were social services and membership organizations (9.5%), hotels and other lodging places (8.4%), motion pictures (7.2%), and personal services (5.8%). The health services, legal services, and miscellaneous professional services components realized gains of 3.0%, 3.3%, and 0.2%, respectively. The private households (babysitting and other domestic services) and business services components showed declines of 1.5% and 1.6%, respectively.

The retail trade sector, at nearly 11% of the total GIP, was the fourth most significant sector. This sector, in 1988, realized an increase of 2.6% from the previous year. Although not itemized by major group, this

sector is comprised of establishments engaged in the selling of merchandise, for personal or household consumption, to the general public.

The finance, insurance, and real estate (FIRE) sector was the fifth most significant sector in the GIP total for 1988. However, at nearly 9% of the total GIP, this sector realized the most significant decline from 1987, falling 8.6%. This sector includes establishments operating primarily in the fields of banking, lending, investments, security and commodity brokering, insurance, and real estate. The components within this sector were grouped into two major categories: 1.) banking and credit agencies, and 2.) other finance, insurance, and real estate. Although the banking and credit agencies component realized a 4.4% increase over 1987, it was not enough to offset the 12.4% decline realized in the other finance, insurance, and real estate component.

The sixth most significant sector in the GIP total was the manufacturing sector, at 7%. The manufacturing sector includes establishments engaged in the mechanical or chemical transformation of materials or substances into new products. The material processed by these establishments include products of agriculture, forestry, fishing, mining, and quarrying, as well as products of other manufacturing establishments. In addition, this sector is categorized by class of merchandise produced, either durable or nondurable. This major sector realized the most significant increase, within the GIP, of 13.6% over the 1987 level. Manufacturing of nondurable goods increased by 18.8% from the 1987 level. The most notable increases within this category of the manufacturing sector include apparel and other textile products, at 56.8% over the 1987 level, textile mill products (50.0%), chemicals and allied products (36.9%), rubber and miscellaneous plastic products (35.7%), printing and publishing (22.7%), paper and allied products (25.0%), petroleum and coal products (16.8%), and food and kindred products (8.5%). The leather and leather products group showed the only decline within this category, falling 12.2% from the 1987 level. Manufacturing of durable goods, at 3.1% over the level of 1987, revealed notable increases in the furniture and fixtures component, at 175.0% over the 1987 level, instruments and related products (159.5%) motor vehicles and equipment (38.9%), miscellaneous manufacturing industries (24.0%), primary metal industries (23.8%), transportation equipment except motor vehicles (16.2%), machinery (except electrical) (7.6%), and fabricated metal products (3.9%). Significant declines were realized in the electric and electronic equipment component, and the stone, clay, and glass products component of -20.2% and -17.1%, respectively. The latter of these two components was the major offsetting component for the overall durable goods category.

The construction sector, at nearly 7% of the total GIP, fell for the third consecutive year in 1988. Although seventh in significance to the total GIP, construction was 4.1% below the 1987 level. This sector has not realized an increase since 1985, when construction activity boosted it to nearly 29% over the previous year level. Although not itemized by major group, the construction sector includes establishments engaged primarily in new construction, additions, alterations, reconstruction, installations, and repairs.

The eighth most significant sector within the GIP total was wholesale trade. Providing nearly 5% of total GIP, this sector experienced its third consecutive year of decline as well, falling 0.9% below the 1987 level. This sector was not itemized either, but it includes establishments or places of business primarily engaged in the selling of merchandise to trading establishments, to industrial, commercial, institutional, farm, construction contractors, professional business users, and other wholesalers.

The agricultural services, forestry, fisheries and other sector, at roughly 1% of total GIP, was the least significant. The 1988 sector total was relatively unchanged from the year

earlier level. This sector is comprised of establishments primarily engaged in soil preparation services, crop services, animal services, tree farms, forest nurseries, fish production and harvest, and commercial hunting and trapping. This sector was not itemized, and does not include farm production.

GROSS FARM PRODUCT

The total gross farm product (GFP) for 1988, at $298 million, was up 10.1% from the 1987 level. Stemming primarily from an 11.5% increase over 1987 in cash receipts, the growth in the total value of farm output more than offset the 12% escalation in intermediate farm expenditures. Increases in livestock, feed, and other miscellaneous expenditures were the primary grounds for the large hike in the total intermediate expenditures.

Agriculture holds a vital role in the Wyoming economy. However, the importance of this industry is only partially indicated through estimating GFP. To accurately assess the total value, or total impact, that the agriculture industry, as a whole, plays in the state's economy, it is necessary to account for the numerous transactions among the other sectors that occur with each sale of agricultural goods. The GFP, at nearly 4% of the total gross state product, does not include these transactions; therefore, the GFP estimate does not indicate the total importance of this industry to the state.

GROSS GOVERNMENT PRODUCT

The total gross government product (GGP) for 1988 was up 3% over the year earlier level. Of the $1.5 billion total for the GGP division, the state and local component made up 73.5%, while the federal government (including military) contributed the remaining 26.5%. This is the second consecutive year in which the state and local component declined, while the federal component increased, in shares of the GGP. In terms of annual percent change, the state and local component was up 2.3%, while the federal (including military) component was up 5.8%.

References

[1]The Concept and Estimation of Gross State Product, The Southern Economic Journal, Volume XXXII, Number 2, October 1965, pp. 153-168.

[2]United States gross national product estimates (1960-1976), National Income and Product Accounts of the United States, 1929-82: Statistical Tables, United State Department of Commerce. United States gross national product estimates revised (1977-1988), January 1991, United States Department of Commerce, Bureau of Economic Analysis. These revised estimates are subject to further revision; the 1987 and 1988 estimates will be revised in the spring of 1991, and estimates for all years will be revised following the forthcoming comprehensive GNP revision.

[3]Farm income, cash receipts, and production expenditures (1984-1988), Wyoming Agricultural Statistics, 1990, United States Department of Agriculture, Wyoming Agricultural Statistics Service, pp. 31-33. Historical data were obtained from the same source and include revisions.

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(**Editor's Note:** A more comprehensive report on the Wyoming Gross State Product is available from the Department of Administration and Information, Division of Economic Analysis.)

# TABLE 1 - GROSS STATE PRODUCT ESTIMATES FOR 1960 THROUGH 1974 (Millions of Current Dollars)

| INDUSTRY | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ag. services, forestry, fisheries & other | 2.04 | 2.66 | 4.08 | 3.54 | 4.66 | 4.83 | 5.27 | 5.60 | 6.10 | 7.54 | 7.40 | [illegible] | 10.45 | 12.35 | 14.16 |
| Mining: | 220.53 | 217.71 | 224.22 | 229.75 | 221.24 | 221.75 | 232.93 | 241.26 | 296.53 | 357.30 | 359.44 | [illegible] | 378.99 | 467.22 | 816.54 |
| Coal mining | 2.96 | 3.66 | 3.80 | 2.69 | 3.03 | 2.90 | 3.05 | 2.86 | 2.93 | 3.17 | 7.33 | [illegible] | 14.54 | 19.53 | 45.40 |
| Oil & gas extraction | 188.88 | 183.57 | 187.49 | 181.49 | 176.50 | 178.43 | 184.95 | 200.32 | 242.42 | 290.22 | 280.66 | 274.64 | 285.99 | 335.20 | 635.02 |
| Metal mining | 18.87 | 20.25 | 22.39 | 32.78 | 24.46 | 23.15 | 25.55 | 15.72 | 27.32 | 35.00 | 41.76 | 36.07 | 36.52 | 51.33 | 51.44 |
| Non-metallic minerals, except fuels | 9.82 | 10.23 | 10.54 | 12.79 | 17.26 | 17.27 | 19.38 | 22.36 | 23.87 | 28.90 | 29.69 | 35.03 | 41.94 | 61.15 | 84.68 |
| Construction | 101.24 | 87.34 | 80.29 | 85.36 | 90.32 | 79.76 | 77.47 | 79.04 | 89.10 | 91.99 | 102.79 | 122.87 | 151.73 | 211.84 | 284.08 |
| Manufacturing: | 90.27 | 88.23 | 86.98 | 92.64 | 92.71 | 102.24 | 105.94 | 104.79 | 105.84 | 108.21 | 118.69 | 126.99 | 138.60 | 173.34 | 166.69 |
| Nondurable goods: | 70.32 | 68.55 | 65.91 | 70.38 | 72.44 | 81.83 | 85.86 | 82.41 | 80.08 | 77.56 | 86.52 | 90.12 | 94.97 | 119.73 | 111.01 |
| Food and kindred products | 12.91 | 13.42 | 13.20 | 13.77 | 15.37 | 15.90 | 15.23 | 14.66 | 16.25 | 16.94 | 16.49 | 15.84 | 16.40 | 18.51 | 18.73 |
| Textile mill products | 0.02 | 0.02 | 0.07 | 0.11 | 0.09 | 0.09 | 0.08 | 0.08 | 0.08 | 0.18 | 0.10 | 0.07 | 0.06 | (L) | (L) |
| Apparel and other textile products | 0.04 | 0.04 | 0.04 | 0.04 | 0.03 | 0.04 | 0.04 | 0.05 | 0.05 | 0.10 | 0.07 | 0.36 | 1.05 | 1.59 | 1.71 |
| Paper and allied products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) |
| Printing and publishing | 4.65 | 4.67 | 4.80 | 5.04 | 5.57 | 5.83 | 6.06 | 6.08 | 6.47 | 6.97 | 7.01 | 7.54 | 8.38 | 9.41 | 10.08 |
| Chemicals and allied products | 2.35 | 2.25 | 2.23 | 1.76 | 0.72 | 1.43 | 2.13 | 2.66 | 2.90 | 3.16 | 3.57 | 4.03 | 4.63 | 5.60 | 7.68 |
| Petroleum and coal products | 50.30 | 48.11 | 45.53 | 49.62 | 50.61 | 58.47 | 62.24 | 58.79 | 54.19 | 49.96 | 58.78 | 61.65 | 63.38 | 82.82 | 71.00 |
| Tobacco manufactures | (L) | (L) | (L) | (L) | (L) | (L) | (L) | (L) | (L) | 0.01 | (L) | 0.01 | 0.01 | 0.01 | 0.02 |
| Rubber and misc. plastic products | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.05 | 0.04 | 0.04 | 0.09 | 0.16 | 0.31 | 0.38 | 0.88 | 1.47 | 1.48 |
| Leather and leather products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) |
| Durable goods: | 19.95 | 19.68 | 21.06 | 22.26 | 20.27 | 20.41 | 20.08 | 22.38 | 25.76 | 30.64 | 32.17 | 36.87 | 43.53 | 53.61 | 55.58 |
| Lumber and wood products | 7.68 | 7.30 | 6.97 | 7.69 | 7.99 | 8.73 | 9.08 | 9.72 | 10.94 | 12.94 | 12.30 | 14.73 | 17.76 | 23.42 | 23.05 |
| Furniture and fixtures | 0.10 | 0.10 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.12 | 0.10 | 0.14 | 0.32 | 0.68 | 0.54 |
| Primary metal industries | 0.14 | 0.53 | 2.13 | 1.41 | 0.01 | 0.01 | 0.22 | 0.29 | 0.26 | 0.27 | 0.28 | 0.28 | 0.17 | 0.41 | 0.79 |
| Fabricated metal products | 0.91 | 0.82 | 0.95 | 1.57 | 0.80 | 0.86 | 0.73 | 0.79 | 0.80 | 1.35 | 1.78 | 2.09 | 2.71 | 3.38 | 5.03 |
| Machinery, except electrical | 0.78 | 0.79 | 0.83 | 0.74 | 1.03 | 1.05 | 1.15 | 1.57 | 3.09 | 5.21 | 6.59 | 7.80 | 8.75 | 9.99 | 9.25 |
| Electric and electronic equipment | 0.17 | 0.17 | 0.27 | 0.22 | 0.24 | 0.28 | 0.35 | 0.45 | 0.31 | 0.37 | 0.60 | 0.43 | 0.31 | 0.52 | 0.68 |
| Transportation equip., except mot. veh. | 0.11 | 0.45 | 1.78 | 1.89 | 1.62 | 1.17 | 0.97 | 1.70 | 1.59 | 1.03 | 0.53 | 0.29 | 0.35 | 0.64 | 1.11 |
| Motor vehicles and equipment | 0.88 | 0.58 | 0.69 | 0.76 | 0.75 | 0.71 | 0.80 | 0.42 | (L) | (L) | (L) | 0.08 | 0.17 | 0.24 | 0.23 |
| Stone, clay, and glass products | 5.39 | 6.01 | 6.16 | 6.80 | 6.79 | 6.65 | 5.50 | 5.94 | 7.33 | 7.95 | 8.63 | 9.72 | 11.58 | 12.88 | 13.40 |
| Instruments and related products | 3.54 | 2.64 | 0.89 | 0.78 | 0.65 | 0.54 | 0.86 | 1.10 | 0.97 | 0.88 | 0.76 | 0.62 | 0.74 | 0.90 | 1.03 |
| Miscellaneous manufacturing ind. | 0.25 | 0.28 | 0.33 | 0.34 | 0.34 | 0.36 | 0.36 | 0.34 | 0.40 | 0.53 | 0.59 | 0.67 | 0.67 | 0.56 | 0.47 |
| Transportation, communication, & public utilities: | 134.02 | 144.71 | 148.42 | 155.35 | 166.35 | 170.29 | 170.88 | 171.12 | 185.84 | 199.81 | 214.48 | 238.11 | 264.43 | 301.09 | 340.45 |
| Railroad transportation | 47.38 | 46.08 | 48.06 | 49.10 | 52.79 | 54.95 | 56.24 | 53.53 | 53.30 | 56.45 | 61.83 | 65.12 | 68.64 | 73.59 | 81.85 |
| Trucking and warehousing | 21.92 | 20.85 | 20.22 | 18.78 | 18.71 | 20.34 | 20.66 | 20.29 | 24.49 | 28.56 | 30.31 | 32.55 | 37.96 | 48.10 | 61.63 |
| Water transportation | 0.06 | 0.09 | 0.09 | 0.09 | 0.09 | 0.10 | 0.09 | 0.08 | 0.16 | 0.04 | 0.10 | 0.12 | 0.17 | 0.23 | 0.19 |
| Other transportation: | 16.18 | 19.51 | 16.87 | 19.41 | 21.40 | 22.31 | 21.66 | 21.92 | 25.40 | 28.02 | 31.04 | 30.36 | 32.95 | 34.92 | 37.43 |
| Local and interurban passenger transit | 2.94 | 3.20 | 3.27 | 3.16 | 3.32 | 3.50 | 3.73 | 3.60 | 3.55 | 3.58 | 3.84 | 4.04 | 4.31 | 4.59 | 5.68 |
| Transportation by air | 1.26 | 1.45 | 1.36 | 1.73 | 1.85 | 2.25 | 2.13 | 2.16 | 2.36 | 2.49 | 2.76 | 3.55 | 3.84 | 3.52 | 4.21 |
| Pipelines, except natural gas | 11.58 | 14.24 | 11.81 | 14.04 | 15.76 | 16.21 | 15.30 | 15.64 | 18.95 | 21.36 | 24.09 | 22.33 | 24.49 | 26.15 | 24.83 |
| Transportation services | 0.40 | 0.62 | 0.44 | 0.47 | 0.47 | 0.35 | 0.51 | 0.51 | 0.53 | 0.59 | 0.35 | 0.44 | 0.31 | 0.65 | 2.71 |
| Communication | 19.76 | 21.10 | 22.29 | 24.02 | 25.41 | 26.35 | 26.34 | 27.92 | 30.21 | 31.74 | 35.15 | 40.20 | 45.61 | 53.95 | 63.51 |
| Electric, gas, and sanitary services | 28.72 | 37.07 | 40.88 | 43.96 | 47.96 | 46.23 | 45.89 | 47.38 | 52.28 | 54.99 | 56.04 | 69.75 | 79.10 | 90.30 | 95.84 |
| Wholesale trade | 41.21 | 42.37 | 44.78 | 37.19 | 43.59 | 42.18 | 43.58 | 45.76 | 50.38 | 52.80 | 56.13 | 64.22 | 70.37 | 79.93 | 109.06 |
| Retail trade | 98.02 | 101.13 | 106.76 | 108.80 | 116.79 | 121.59 | 123.84 | 130.64 | 142.90 | 157.74 | 168.13 | 186.67 | 207.17 | 235.53 | 262.03 |
| Finance, insurance, and real estate: | 76.01 | 79.84 | 84.56 | 86.70 | 93.09 | 99.27 | 104.85 | 107.16 | 109.90 | 128.11 | 133.76 | 148.31 | 161.58 | 173.08 | 187.39 |
| Banking and credit agencies | 14.18 | 14.33 | 14.78 | 15.47 | 16.65 | 18.43 | 19.06 | 20.33 | 22.92 | 25.99 | 28.41 | 28.26 | 31.19 | 33.29 | 39.31 |
| Other finance, insurance, and real est. | 61.83 | 65.51 | 69.78 | 71.23 | 76.44 | 80.84 | 85.80 | 86.83 | 86.98 | 102.11 | 105.35 | 120.05 | 130.39 | 139.79 | 148.08 |
| Services: | 87.43 | 94.45 | 98.27 | 96.17 | 103.69 | 111.86 | 117.60 | 119.85 | 128.25 | 145.39 | 156.85 | 172.85 | 192.10 | 215.93 | 258.24 |
| Hotels and other lodging places | 16.03 | 14.87 | 16.01 | 17.95 | 18.19 | 21.34 | 24.03 | 24.73 | 27.04 | 28.18 | 31.44 | 33.84 | 38.34 | 40.02 | 46.82 |
| Personal services | 9.59 | 9.54 | 9.56 | 9.70 | 11.00 | 11.28 | 12.10 | 11.90 | 12.33 | 13.79 | 14.86 | 14.65 | 15.33 | 16.03 | 18.35 |
| Private households | 5.22 | 5.04 | 5.12 | 5.06 | 5.12 | 5.16 | 5.06 | 5.18 | 5.26 | 5.06 | 5.14 | 5.21 | 5.19 | 5.40 | 5.16 |
| Business services | 6.52 | 8.00 | 6.64 | 5.87 | 6.01 | 6.56 | 7.34 | 7.48 | 8.18 | 10.68 | 11.48 | 14.64 | 15.24 | 17.59 | 23.41 |
| Auto repair, services, and garages | 6.01 | 6.24 | 6.96 | 7.22 | 7.98 | 7.91 | 8.26 | 8.36 | 9.01 | 12.01 | 12.58 | 15.53 | 17.99 | 20.79 | 24.04 |
| Miscellaneous repair services | 3.93 | 4.47 | 4.22 | 4.14 | 4.29 | 4.54 | 4.85 | 4.59 | 5.65 | 7.33 | 7.32 | 7.31 | 8.70 | 9.38 | 12.22 |
| Amusement and recreation services | 2.76 | 3.74 | 3.72 | 3.87 | 5.25 | 5.91 | 5.66 | 5.61 | 5.81 | 5.57 | 5.85 | 5.75 | 6.25 | 6.96 | 7.31 |
| Motion pictures | 1.27 | 1.21 | 1.36 | 1.29 | 1.33 | 1.29 | 1.21 | 1.18 | 1.58 | 1.47 | 1.36 | 1.41 | 1.46 | 1.72 | 1.80 |
| Health services | 14.73 | 15.66 | 17.29 | 17.69 | 19.30 | 20.47 | 22.47 | 22.97 | 24.53 | 29.01 | 31.48 | 33.24 | 38.58 | 42.80 | 51.79 |
| Legal services | 3.79 | 4.36 | 4.45 | 4.71 | 5.02 | 5.58 | 6.11 | 5.82 | 6.78 | 7.54 | 9.14 | 9.52 | 11.33 | 12.91 | 15.57 |
| Educational services | 0.54 | 0.50 | 0.46 | 0.54 | 0.65 | 0.74 | 0.79 | 1.00 | 1.00 | 1.49 | 1.53 | 2.06 | 2.88 | 3.67 | 4.00 |
| Social services & membership org's. | 9.11 | 10.28 | 11.25 | 11.13 | 10.90 | 12.07 | 10.29 | 11.46 | 12.02 | 13.08 | 13.35 | 14.78 | 15.29 | 17.97 | 22.41 |
| Miscellaneous professional services | 7.95 | 10.54 | 11.23 | 6.99 | 8.65 | 9.01 | 9.44 | 9.59 | 10.04 | 10.18 | 11.31 | 14.91 | 15.53 | 20.69 | 25.36 |
| GROSS INDUSTRIAL PRODUCT | 850.76 | 858.42 | 878.36 | 895.51 | 932.45 | 953.79 | 982.37 | 1005.22 | 1114.85 | 1248.87 | 1317.68 | 1425.01 | 1575.33 | 1870.31 | 2438.52 |
| GROSS FARM PRODUCT | 90.00 | 89.00 | 96.00 | 97.30 | 80.00 | 93.30 | 106.90 | 119.90 | 94.60 | 105.30 | 113.20 | 121.20 | 166.20 | 224.80 | 184.30 |
| GROSS GOVERNMENT PRODUCT | 115.59 | 126.34 | 134.80 | 146.28 | 163.77 | 169.46 | 177.87 | 201.18 | 220.48 | 237.37 | 264.25 | 295.54 | 327.53 | 367.95 | 405.48 |
| TOTAL GROSS STATE PRODUCT | 1056.35 | 1073.76 | 1109.16 | 1139.10 | 1176.23 | 1216.54 | 1267.14 | 1326.30 | 1429.93 | 1591.53 | 1695.13 | 1841.75 | 2069.06 | 2463.06 | 3028.30 |

*Totals may not add due to rounding of figures.*
*(D) - Not shown to avoid disclosure of confidential information. Estimates are included in totals.*
*(L) - Less than $5,000. Estimates are included in totals.*

# TABLE 2 - GROSS STATE PRODUCT ESTIMATES FOR 1975 THROUGH 1988 (Millions of Current Dollars)

| INDUSTRY | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ag. services, forestry, fisheries & other | 13.46 | 17.15 | 19.52 | 20.65 | 23.99 | 24.04 | 26.81 | 28.51 | 31.30 | 30.56 | 28.11 | 25.42 | 34.85 | 34.86 |
| Mining: | 967.03 | 976.35 | 1228.41 | 1619.03 | 2212.04 | 3026.06 | 3981.78 | 3492.40 | 3021.25 | 2938.21 | 2577.80 | 1815.56 | 1755.56 | 1791.70 |
| Coal mining | 61.79 | 102.53 | 139.54 | 190.23 | 233.60 | 332.61 | 400.41 | 420.91 | 483.16 | 468.56 | 487.38 | 450.13 | 422.51 | 451.96 |
| Oil & gas extraction | 729.96 | 633.49 | 795.68 | 1045.03 | 1491.42 | 2096.12 | 3094.44 | 2687.12 | 2138.86 | 2089.86 | 1739.64 | 1003.82 | 1028.07 | 1005.19 |
| Metal mining | 49.48 | 87.66 | 113.15 | 164.84 | 224.97 | 262.45 | 163.85 | 91.52 | 93.09 | 56.01 | 39.70 | 34.99 | 33.38 | 38.72 |
| Non-metallic minerals, except fuels | 125.80 | 152.68 | 180.04 | 218.94 | 262.05 | 334.87 | 323.08 | 292.86 | 306.14 | 323.78 | 311.08 | 326.63 | 271.60 | 295.84 |
| Construction | 314.51 | 352.52 | 419.42 | 503.17 | 628.10 | 694.52 | 753.31 | 728.87 | 506.47 | 525.30 | 676.13 | 630.10 | 446.37 | 427.87 |
| Manufacturing: | 201.67 | 248.11 | 277.27 | 311.27 | 327.61 | 339.54 | 386.71 | 398.12 | 387.68 | 402.84 | 383.09 | 412.44 | 426.83 | 484.74 |
| Nondurable goods: | 144.66 | 181.34 | 195.31 | 202.01 | 205.80 | 223.88 | 256.03 | 277.56 | 272.19 | 268.69 | 253.66 | 279.81 | 284.84 | 338.38 |
| Food and kindred products | 27.54 | 28.66 | 30.83 | 30.78 | 32.30 | 32.88 | 35.95 | 37.61 | 36.51 | 35.51 | 39.88 | 41.99 | 43.02 | 46.67 |
| Textile mill products | (L) | 0.01 | 0.01 | (L) | (L) | (L) | (L) | (L) | 0.02 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 |
| Apparel and other textile products | 1.85 | 2.02 | 3.01 | 3.42 | 3.71 | 3.62 | 2.63 | 0.95 | 0.85 | 0.98 | 1.10 | 1.37 | 1.39 | 2.18 |
| Paper and allied products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | 0.28 | 0.07 | 0.14 | 0.13 | 0.06 | 0.04 | 0 05 |
| Printing and publishing | 12.91 | 15.31 | 17.58 | 20.30 | 24.47 | 27.93 | 32.01 | 34.43 | 36.16 | 37.42 | 39.29 | 39.13 | 39.04 | 47.91 |
| Chemicals and allied products | 9.44 | 11.14 | 13.02 | 13.94 | 15.36 | 16.17 | 18.38 | 18.02 | 16.10 | 16.58 | 19.71 | 23.81 | 29.78 | 40.76 |
| Petroleum and coal products | 91.48 | 122.48 | 128.77 | 130.48 | 126.68 | 139.92 | 162.94 | 182.58 | 178.69 | 174.25 | 149.62 | 168.25 | 165.53 | 193.26 |
| Tobacco manufactures | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | (L) | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 |
| Rubber and misc. plastic products | 1.34 | 1.47 | 1.66 | 2.09 | 2.46 | 2.30 | 2.73 | 3.07 | 3.41 | 3.54 | 3.75 | 4.07 | 4.62 | 6.27 |
| Leather and leather products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | 0.60 | 0.36 | 0.25 | 0.26 | 1.11 | 1.39 | 1.22 |
| Durable goods: | 57.01 | 66.76 | 81.96 | 109.26 | 121.81 | 115.67 | 130.68 | 120.55 | 115.49 | 134.15 | 129.43 | 132.63 | 141.98 | 146.36 |
| Lumber and wood products | 18.43 | 25.09 | 31.00 | 36.86 | 39.67 | 31.46 | 31.43 | 25.13 | 30.55 | 34.99 | 32.11 | 36.86 | 44.59 | 46.65 |
| Furniture and fixtures | 0.69 | 0.45 | 0.65 | 0.83 | 0.38 | 0.23 | 0.28 | (D) | (D) | 0.38 | 0.55 | 0.34 | 0.60 | 1.65 |
| Primary metal industries | 0.75 | 0.17 | 0.52 | 0.78 | 1.32 | 1.37 | 2.08 | (D) | (D) | 9.66 | 6.72 | 8.75 | 8.23 | 10.19 |
| Fabricated metal products | 6.79 | 5.92 | 6.68 | 9.50 | 13.43 | 15.36 | 16.63 | 14.71 | 12.59 | 13.30 | 14.83 | 13.99 | 14.76 | 15.34 |
| Machinery, except electrical | 10.08 | 11.57 | 16.32 | 23.66 | 26.07 | 28.92 | 37.75 | 35.12 | 24.18 | 26.45 | 25.82 | 24.77 | 24.45 | 26.30 |
| Electric and electronic equipment | 1.42 | 1.34 | 1.22 | 1.42 | 0.47 | 0.18 | 0.29 | 0.67 | 0.11 | 2.08 | 1.80 | 1.76 | 2.28 | 1.82 |
| Transportation equip., except mot. veh. | 1.19 | 1.05 | 1.22 | 1.52 | 1.47 | 1.66 | 2.25 | 1.79 | 2.26 | 2.60 | 3.09 | 4.03 | 4.76 | 5.53 |
| Motor vehicles and equipment | 0.10 | 0.16 | 0.17 | 0.31 | 0.55 | 0.50 | 0.32 | (D) | (D) | 0.10 | 0.23 | 0.18 | 0.18 | 0.25 |
| Stone, clay, and glass products | 15.32 | 18.59 | 21.31 | 31.02 | 35.15 | 32.68 | 35.36 | 36.85 | 39.33 | 39.94 | 40.16 | 37.36 | 37.24 | 30.86 |
| Instruments and related products | 1.31 | 1.27 | 1.60 | 1.93 | 2.13 | 1.97 | 1.76 | 1.74 | 1.80 | 1.75 | 1.23 | 1.24 | 1.26 | 3.27 |
| Miscellaneous manufacturing ind. | 0.93 | 1.15 | 1.27 | 1.42 | 1.16 | 1.32 | 2.52 | 2.36 | 2.19 | 2.90 | 2.90 | 3.36 | 3.62 | 4.49 |
| Transportation, communication, & public utilities: | 405.12 | 465.03 | 528.69 | 632.11 | 748.62 | 871.35 | 1060.10 | 1114.79 | 1158.08 | 1238.16 | 1268.19 | 1239.17 | 1194.15 | 1259.54 |
| Railroad transportation | 77.35 | 96.39 | 106.99 | 129.89 | 158.25 | 180.25 | 198.37 | 182.70 | 200.24 | 224.51 | 219.23 | 203.93 | 204.76 | 214.48 |
| Trucking and warehousing | 71.46 | 79.29 | 88.48 | 110.88 | 135.42 | 163.48 | 199.80 | 186.19 | 171.76 | 185.90 | 181.80 | 167.12 | 173.92 | 188.03 |
| Water transportation | 0.15 | 0.23 | 0.45 | 0.55 | 0.16 | 0.16 | 0.28 | 0.29 | 0.32 | 0.27 | 0.19 | 0.12 | 0.03 | (D) |
| Other transportation: | 40.29 | 47.86 | 56.13 | 82.17 | 104.90 | 116.36 | 123.54 | 125.95 | 119.00 | 112.67 | 103.77 | 70.47 | 77.77 | (D) |
| Local and interurban passenger transit | 5.04 | 5.82 | 7.16 | 8.60 | 10.01 | 11.18 | 11.27 | 12.08 | 13.17 | 13.24 | 13.18 | 11.21 | 9.64 | (D) |
| Transportation by air | 5.64 | 6.18 | 7.87 | 10.04 | 10.90 | 13.64 | 15.30 | 16.18 | 16.41 | 15.83 | 12.32 | 10.57 | 12.71 | 14.78 |
| Pipelines, except natural gas | 28.01 | 33.58 | 37.37 | 58.48 | 78.94 | 87.56 | 91.30 | 91.71 | 82.46 | 76.06 | 71.11 | 41.26 | 48.53 | 49.31 |
| Transportation services | 1.60 | 2.28 | 3.73 | 5.05 | 5.06 | 3.98 | 5.67 | 5.98 | 6.95 | 7.55 | 7.16 | 7.43 | 6.89 | 9.44 |
| Communication | 79.05 | 93.69 | 103.09 | 121.89 | 140.07 | 161.90 | 189.37 | 190.43 | 195.01 | 177.38 | 174.62 | 170.93 | 168.01 | 168.42 |
| Electric, gas, and sanitary services | 136.83 | 147.57 | 173.55 | 186.73 | 209.81 | 249.19 | 348.75 | 429.23 | 471.75 | 537.42 | 588.58 | 626.60 | 569.66 | 605.19 |
| Wholesale trade | 128.58 | 147.64 | 178.38 | 223.70 | 273.73 | 336.80 | 451.71 | 441.63 | 378.33 | 408.15 | 409.12 | 349.67 | 304.17 | 301.44 |
| Retail trade | 322.36 | 374.74 | 430.84 | 504.96 | 571.15 | 605.70 | 673.80 | 713.54 | 705.94 | 732.11 | 750.83 | 711.87 | 682.91 | 700.67 |
| Finance, insurance, and real estate: | 220.40 | 294.03 | 369.90 | 486.13 | 489.70 | 488.98 | 519.45 | 490.02 | 547.02 | 559.36 | 590.35 | 568.49 | 630.46 | 575.96 |
| Banking and credit agencies | 43.31 | 49.75 | 61.98 | 82.84 | 101.51 | 111.46 | 124.39 | 130.66 | 149.39 | 146.12 | 157.05 | 144.72 | 140.09 | 146.25 |
| Other finance, insurance, and real est. | 177.09 | 244.28 | 307.93 | 403.29 | 388.19 | 377.52 | 395.06 | 359.36 | 397.63 | 413.24 | 433.30 | 423.77 | 490.36 | 429.71 |
| Services: | 312.86 | 368.43 | 423.49 | 526.75 | 616.47 | 727.00 | 780.33 | 815.97 | 791.89 | 851.03 | 882.90 | 918.47 | 938.52 | 993.41 |
| Hotels and other lodging places | 57.53 | 64.36 | 66.35 | 84.33 | 94.71 | 97.54 | 102.75 | 109.68 | 101.78 | 103.40 | 99.67 | 107.42 | 103.68 | 112.35 |
| Personal services | 19.41 | 24.08 | 26.88 | 30.69 | 32.83 | 38.04 | 39.55 | 45.19 | 43.90 | 45.72 | 54.75 | 54.66 | 54.23 | 57.40 |
| Private households | 5.13 | 5.97 | 6.52 | 6.85 | 7.04 | 7.15 | 7.85 | 8.63 | 9.29 | 9.97 | 9.91 | 9.81 | 9.50 | 9.36 |
| Business services | 32.95 | 40.67 | 50.96 | 68.77 | 96.34 | 119.15 | 120.89 | 127.45 | 105.53 | 118.11 | 117.36 | 111.39 | 107.94 | 106.19 |
| Auto repair, services, and garages | 28.96 | 32.31 | 38.61 | 46.40 | 51.84 | 60.20 | 66.95 | 64.95 | 59.87 | 64.18 | 69.17 | 66.27 | 67.67 | 76.73 |
| Miscellaneous repair services | 13.62 | 17.33 | 22.54 | 31.97 | 33.43 | 46.42 | 44.04 | 42.64 | 43.24 | 48.73 | 42.15 | 42.33 | 36.93 | 45.75 |
| Amusement and recreation services | 9.03 | 9.87 | 10.57 | 11.43 | 13.27 | 13.84 | 16.20 | 17.30 | 17.93 | 19.26 | 23.04 | 26.53 | 29.78 | 33.38 |
| Motion pictures | 2.25 | 3.56 | 2.92 | 3.84 | 3.13 | 2.92 | 2.61 | 2.91 | 2.67 | 3.07 | 4.07 | 4.55 | 4.19 | 4.49 |
| Health services | 61.97 | 69.97 | 78.03 | 90.21 | 103.29 | 124.21 | 141.10 | 156.10 | 165.35 | 175.94 | 187.34 | 204.73 | 230.67 | 237.52 |
| Legal services | 17.51 | 18.43 | 19.56 | 27.87 | 30.77 | 32.32 | 34.76 | 41.53 | 48.04 | 56.26 | 59.26 | 65.46 | 69.95 | 72.24 |
| Educational services | 4.03 | 4.43 | 4.71 | 5.26 | 5.77 | 6.94 | 7.01 | 8.02 | 8.86 | 10.44 | 10.86 | 10.81 | 11.83 | 13.84 |
| Social services & membership org's. | 28.03 | 36.03 | 43.09 | 52.62 | 61.15 | 74.56 | 81.45 | 91.61 | 98.75 | 107.18 | 114.39 | 116.08 | 124.11 | 135.96 |
| Miscellaneous professional services | 32.43 | 41.42 | 52.74 | 66.51 | 82.90 | 103.71 | 115.17 | 99.97 | 86.68 | 88.77 | 90.92 | 98.42 | 88.05 | 88.20 |
| GROSS INDUSTRIAL PRODUCT | 2886.00 | 3243.99 | 3875.92 | 4827.78 | 5891.41 | 7113.98 | 8634.00 | 8223.86 | 7527.95 | 7685.71 | 7565.51 | 6671.19 | 6413.81 | 6570.19 |
| GROSS FARM PRODUCT | 146.20 | 139.90 | 147.10 | 202.30 | 269.40 | 271.20 | 234.10 | 185.00 | 195.10 | 212.30 | 207.40 | 243.80 | 270.50 | 297.70 |
| GROSS GOVERNMENT PRODUCT | 458.97 | 527.80 | 587.38 | 665.86 | 730.44 | 877.42 | 1003.34 | 1127.16 | 1263.50 | 1338.81 | 1419.89 | 1471.04 | 1459.87 | 1506.59 |
| TOTAL GROSS STATE PRODUCT | 3491.17 | 3911.69 | 4610.41 | 5695.94 | 6891.25 | 8262.60 | 9871.44 | 9536.02 | 8986.55 | 9236.82 | 9192.80 | 8386.03 | 8144.18 | 8374.48 |

*Totals may not add due to rounding of figures.*

*(D) - Not shown to avoid disclosure of confidential information. Estimates are included in totals.*

*(L) - Less than $5,000. Estimates are included in totals.*

# TABLE 3 - GROSS STATE PRODUCT ESTIMATES FOR 1960 THROUGH 1974 (Millions of Constant Dollars, 1982=100)

| INDUSTRY | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ag. services, forestry, fisheries & other | 6.61 | 8.51 | 12.80 | 10.93 | 14.17 | 14.30 | 15.07 | 15.60 | 16.17 | 18.94 | 17.63 | 19.90 | 22.47 | 24.95 | 26.22 |
| Mining: | 713.68 | 697.77 | 702.89 | 709.10 | 672.47 | 656.08 | 665.52 | 672.04 | 786.55 | 897.73 | 855.80 | 802.14 | 815.03 | 943.88 | 1512.11 |
| Coal mining | 9.58 | 11.72 | 11.92 | 8.31 | 9.22 | 8.58 | 8.71 | 7.96 | 7.76 | 7.96 | 17.45 | 23.69 | 31.28 | 39.46 | 84.08 |
| Oil & gas extraction | 611.25 | 588.38 | 587.73 | 560.16 | 536.48 | 527.91 | 528.44 | 558.01 | 643.02 | 729.21 | 668.23 | 618.32 | 615.03 | 677.18 | 1175.96 |
| Metal mining | 61.07 | 64.89 | 70.19 | 101.16 | 74.31 | 68.48 | 72.99 | 43.79 | 72.47 | 87.94 | 99.44 | 81.23 | 78.55 | 103.70 | 95.27 |
| Non-metallic minerals, except fuels | 31.77 | 32.78 | 33.05 | 39.47 | 52.46 | 51.10 | 55.38 | 62.29 | 63.30 | 72.62 | 70.68 | 78.90 | 90.18 | 123.54 | 156.81 |
| Construction | 327.63 | 279.92 | 251.69 | 263.47 | 274.54 | 235.97 | 221.33 | 220.17 | 236.35 | 231.12 | 244.75 | 276.74 | 326.30 | 427.95 | 526.07 |
| Manufacturing: | 292.14 | 282.78 | 272.65 | 285.91 | 281.80 | 302.49 | 302.70 | 291.89 | 280.74 | 271.88 | 282.60 | 286.02 | 297.85 | 350.19 | 308.50 |
| Nondurable goods: | 227.57 | 219.71 | 206.63 | 217.22 | 220.19 | 242.11 | 245.31 | 229.56 | 212.40 | 194.88 | 206.00 | 202.98 | 204.23 | 241.99 | 205.58 |
| Food and kindred products | 41.78 | 43.01 | 41.39 | 42.61 | 46.71 | 47.04 | 43.52 | 40.83 | 43.10 | 42.55 | 39.26 | 35.68 | 35.27 | 37.39 | 34.68 |
| Textile mill products | 0.06 | 0.06 | 0.21 | 0.33 | 0.26 | 0.27 | 0.24 | 0.23 | 0.21 | 0.45 | 0.24 | 0.17 | 0.13 | (L) | 0.01 |
| Apparel and other textile products | 0.14 | 0.14 | 0.11 | 0.11 | 0.10 | 0.13 | 0.10 | 0.14 | 0.14 | 0.25 | 0.16 | 0.81 | 2.26 | 3.20 | 3.16 |
| Paper and allied products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) |
| Printing and publishing | 15.05 | 14.96 | 15.05 | 15.56 | 16.93 | 17.24 | 17.32 | 16.94 | 17.16 | 17.51 | 16.69 | 16.98 | 18.01 | 19.01 | 18.66 |
| Chemicals and allied products | 7.62 | 7.20 | 7.00 | 6.43 | 2.20 | 4.23 | 6.08 | 7.41 | 7.68 | 7.95 | 8.50 | 9.08 | 9.95 | 11.32 | 14.23 |
| Petroleum and coal products | 162.80 | 154.20 | 142.74 | 153.15 | 153.82 | 172.98 | 177.83 | 163.77 | 143.75 | 125.54 | 139.96 | 138.86 | 136.31 | 167.32 | 131.48 |
| Tobacco manufactures | (L) | (L) | (L) | (L) | (L) | (L) | (L) | (L) | (L) | 0.03 | (L) | 0.03 | 0.03 | 0.02 | 0.03 |
| Rubber and misc. plastic products | 0.06 | 0.08 | 0.07 | 0.08 | 0.08 | 0.14 | 0.10 | 0.12 | 0.24 | 0.40 | 0.75 | 0.85 | 1.89 | 2.96 | 2.74 |
| Leather and leather products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) | (D) |
| Durable goods: | 64.57 | 63.06 | 66.03 | 68.70 | 61.61 | 60.38 | 57.38 | 62.33 | 68.34 | 76.99 | 76.60 | 83.03 | 93.62 | 108.30 | 102.92 |
| Lumber and wood products | 24.84 | 23.38 | 21.85 | 23.74 | 24.30 | 25.83 | 25.93 | 27.09 | 29.02 | 32.51 | 29.28 | 33.18 | 38.19 | 47.31 | 42.68 |
| Furniture and fixtures | 0.32 | 0.31 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.13 | 0.15 | 0.31 | 0.25 | 0.31 | 0.68 | 1.37 | 1.00 |
| Primary metal industries | 0.46 | 1.69 | 6.67 | 4.34 | 0.02 | 0.02 | 0.64 | 0.80 | 0.70 | 0.69 | 0.66 | 0.64 | 0.37 | 0.83 | 1.46 |
| Fabricated metal products | 2.95 | 2.63 | 2.98 | 4.84 | 2.43 | 2.54 | 2.08 | 2.20 | 2.12 | 3.38 | 4.24 | 4.71 | 5.83 | 6.82 | 9.32 |
| Machinery, except electrical | 2.54 | 2.54 | 2.61 | 2.28 | 3.12 | 3.10 | 3.30 | 4.38 | 8.21 | 13.08 | 15.70 | 17.57 | 18.82 | 20.18 | 17.13 |
| Electric and electronic equipment | 0.56 | 0.54 | 0.86 | 0.69 | 0.73 | 0.82 | 1.00 | 1.26 | 0.82 | 0.92 | 1.43 | 0.98 | 0.68 | 1.06 | 1.26 |
| Transportation equip., except mot. veh. | 0.35 | 1.46 | 5.57 | 5.84 | 4.94 | 3.45 | 2.77 | 4.74 | 4.23 | 2.58 | 1.25 | 0.65 | 0.75 | 1.29 | 2.06 |
| Motor vehicles and equipment | 2.85 | 1.87 | 2.17 | 2.36 | 2.27 | 2.10 | 2.28 | 1.18 | 0.01 | 0.01 | 0.01 | 0.19 | 0.36 | 0.48 | 0.42 |
| Stone, clay, and glass products | 17.44 | 19.27 | 19.32 | 20.99 | 20.63 | 19.67 | 15.73 | 16.54 | 19.45 | 19.96 | 20.54 | 21.90 | 24.90 | 26.02 | 24.82 |
| Instruments and related products | 11.47 | 8.47 | 2.80 | 2.41 | 1.97 | 1.59 | 2.46 | 3.07 | 2.56 | 2.21 | 1.82 | 1.39 | 1.60 | 1.82 | 1.90 |
| Miscellaneous manufacturing ind. | 0.79 | 0.91 | 1.02 | 1.04 | 1.03 | 1.08 | 1.02 | 0.94 | 1.07 | 1.34 | 1.41 | 1.51 | 1.45 | 1.12 | 0.88 |
| Transportation, communication, & public utilities: | 433.72 | 463.82 | 466.25 | 479.47 | 505.63 | 503.82 | 488.22 | 476.66 | 492.94 | 502.04 | 510.67 | 536.28 | 568.66 | 608.26 | 630.46 |
| Railroad transportation | 153.34 | 147.71 | 150.67 | 151.54 | 160.45 | 162.58 | 160.69 | 149.10 | 141.38 | 141.84 | 147.22 | 146.68 | 147.62 | 148.67 | 151.57 |
| Trucking and warehousing | 70.93 | 66.82 | 63.40 | 57.96 | 56.86 | 60.19 | 59.02 | 56.53 | 64.97 | 71.77 | 72.18 | 73.32 | 81.63 | 97.18 | 114.13 |
| Water transportation | 0.21 | 0.30 | 0.29 | 0.27 | 0.27 | 0.29 | 0.26 | 0.22 | 0.42 | 0.11 | 0.23 | 0.26 | 0.37 | 0.45 | 0.35 |
| Other transportation: | 52.35 | 62.54 | 52.89 | 59.89 | 65.03 | 66.02 | 61.89 | 61.05 | 67.37 | 70.41 | 73.90 | 68.39 | 70.85 | 70.55 | 69.31 |
| Local and interurban passenger transit | 9.50 | 10.27 | 10.25 | 9.76 | 10.09 | 10.34 | 10.66 | 10.04 | 9.41 | 8.99 | 9.14 | 9.10 | 9.27 | 9.28 | 10.51 |
| Transportation by air | 4.09 | 4.64 | 4.25 | 5.34 | 5.62 | 6.67 | 6.08 | 6.03 | 6.27 | 6.27 | 6.57 | 8.00 | 8.26 | 7.11 | 7.80 |
| Pipelines, except natural gas | 37.47 | 45.63 | 37.03 | 43.34 | 47.90 | 47.97 | 43.71 | 43.56 | 50.27 | 53.67 | 57.35 | 50.30 | 52.66 | 52.83 | 45.98 |
| Transportation services | 1.30 | 2.00 | 1.36 | 1.44 | 1.42 | 1.04 | 1.45 | 1.43 | 1.42 | 1.49 | 0.84 | 1.00 | 0.66 | 1.32 | 5.02 |
| Communication | 63.94 | 67.64 | 69.86 | 74.14 | 77.23 | 77.97 | 75.25 | 77.78 | 80.13 | 79.75 | 83.70 | 90.54 | 98.08 | 109.00 | 117.61 |
| Electric, gas, and sanitary services | 92.95 | 118.81 | 128.14 | 135.67 | 145.79 | 136.77 | 131.10 | 131.97 | 138.66 | 138.15 | 133.43 | 157.10 | 170.11 | 182.42 | 177.49 |
| Wholesale trade | 133.37 | 135.81 | 140.36 | 114.79 | 132.48 | 124.80 | 124.51 | 127.47 | 133.64 | 132.66 | 133.65 | 144.65 | 151.34 | 161.47 | 201.96 |
| Retail trade | 317.20 | 324.13 | 334.68 | 335.81 | 354.99 | 359.75 | 353.83 | 363.91 | 379.05 | 396.32 | 400.31 | 420.42 | 445.53 | 475.83 | 485.23 |
| Finance, insurance, and real estate: | 245.98 | 255.89 | 265.08 | 267.60 | 282.95 | 293.69 | 299.58 | 298.48 | 291.52 | 321.87 | 318.47 | 334.04 | 347.49 | 349.66 | 347.01 |
| Banking and credit agencies | 45.89 | 45.93 | 46.32 | 47.74 | 50.62 | 54.53 | 54.44 | 56.63 | 60.80 | 65.31 | 67.64 | 63.65 | 67.08 | 67.25 | 72.79 |
| Other finance, insurance, and real est. | 200.09 | 209.96 | 218.76 | 219.86 | 232.33 | 239.16 | 245.13 | 241.86 | 230.73 | 256.56 | 250.83 | 270.39 | 280.41 | 282.41 | 274.22 |
| Services: | 282.93 | 302.73 | 308.07 | 296.84 | 315.17 | 330.96 | 336.01 | 333.85 | 340.20 | 365.31 | 373.46 | 389.30 | 413.12 | 436.22 | 478.22 |
| Hotels and other lodging places | 51.86 | 47.65 | 50.19 | 55.40 | 55.29 | 63.14 | 68.65 | 68.87 | 71.73 | 70.81 | 74.87 | 76.21 | 82.45 | 80.85 | 86.70 |
| Personal services | 31.03 | 30.57 | 29.98 | 29.94 | 33.43 | 33.37 | 34.58 | 33.15 | 32.72 | 34.64 | 35.39 | 32.99 | 32.97 | 32.37 | 33.99 |
| Private households | 16.89 | 16.14 | 16.05 | 15.62 | 15.56 | 15.28 | 14.45 | 14.42 | 13.95 | 12.72 | 12.24 | 11.74 | 11.16 | 10.91 | 9.55 |
| Business services | 21.10 | 25.63 | 20.81 | 18.13 | 18.27 | 19.40 | 20.97 | 20.82 | 21.71 | 26.83 | 27.33 | 32.96 | 32.78 | 35.53 | 43.35 |
| Auto repair, services, and garages | 19.44 | 20.01 | 21.83 | 22.29 | 24.26 | 23.39 | 23.59 | 23.30 | 23.90 | 30.18 | 29.94 | 34.98 | 38.68 | 41.99 | 44.52 |
| Miscellaneous repair services | 12.70 | 14.34 | 13.22 | 12.79 | 13.03 | 13.44 | 13.86 | 12.78 | 14.99 | 18.42 | 17.44 | 16.46 | 18.70 | 18.95 | 22.63 |
| Amusement and recreation services | 8.93 | 12.00 | 11.67 | 11.96 | 15.96 | 17.49 | 16.18 | 15.63 | 15.41 | 14.00 | 13.93 | 12.95 | 13.45 | 14.07 | 13.54 |
| Motion pictures | 4.10 | 3.87 | 4.26 | 3.98 | 4.03 | 3.81 | 3.46 | 3.28 | 4.20 | 3.69 | 3.24 | 3.17 | 3.14 | 3.47 | 3.34 |
| Health services | 47.68 | 50.19 | 54.19 | 54.60 | 58.66 | 60.58 | 64.19 | 63.97 | 65.08 | 72.88 | 74.96 | 74.87 | 82.96 | 86.46 | 95.90 |
| Legal services | 12.25 | 13.99 | 13.95 | 14.54 | 15.27 | 16.50 | 17.47 | 16.22 | 15.34 | 18.94 | 21.76 | 21.44 | 24.36 | 26.08 | 28.83 |
| Educational services | 1.74 | 1.62 | 1.45 | 1.66 | 1.98 | 2.18 | 2.25 | 2.77 | 2.66 | 3.75 | 3.65 | 4.65 | 6.19 | 7.42 | 7.40 |
| Social services & membership org's. | 29.48 | 32.94 | 35.27 | 34.35 | 33.14 | 35.71 | 29.39 | 31.92 | 31.89 | 32.87 | 31.78 | 33.29 | 32.88 | 36.30 | 41.50 |
| Miscellaneous professional services | 25.72 | 33.77 | 35.20 | 21.58 | 26.29 | 26.67 | 26.98 | 26.71 | 26.63 | 25.57 | 26.93 | 33.57 | 33.41 | 41.80 | 46.97 |
| GROSS INDUSTRIAL PRODUCT | 2753.27 | 2751.36 | 2753.48 | 2763.92 | 2834.21 | 2821.85 | 2806.76 | 2800.07 | 2957.17 | 3137.86 | 3137.34 | 3209.48 | 3387.80 | 3778.41 | 4515.78 |
| GROSS FARM PRODUCT | 291.26 | 285.26 | 300.94 | 300.31 | 243.16 | 276.04 | 305.43 | 333.98 | 250.93 | 264.57 | 269.52 | 272.97 | 357.42 | 454.14 | 341.30 |
| GROSS GOVERNMENT PRODUCT | 374.06 | 404.93 | 422.58 | 451.49 | 497.79 | 501.35 | 508.20 | 560.38 | 584.83 | 596.40 | 629.17 | 665.64 | 704.38 | 743.33 | 750.89 |
| TOTAL GROSS STATE PRODUCT | 3418.60 | 3441.54 | 3477.00 | 3515.73 | 3575.16 | 3599.24 | 3620.39 | 3694.43 | 3792.92 | 3998.83 | 4036.03 | 4148.10 | 4449.59 | 4975.88 | 5607.97 |

*Totals may not add due to rounding of figures.*
*(D) - Not shown to avoid disclosure of confidential information. Estimates are included in totals.*
*(L) - Less than $5,000. Estimates are included in totals.*

# TABLE 4 - GROSS STATE PRODUCT ESTIMATES FOR 1975 THROUGH 1988 (Millions of Constant Dollars, 1982=100)

| INDUSTRY | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ag. services, forestry, fisheries & other | 22.70 | 27.17 | 29.01 | 28.60 | 30.52 | 28.05 | 28.52 | 28.61 | 30.13 | 28.37 | 25.35 | 22.34 | 29.68 | 28.74 |
| Mining: | 1630.75 | 1547.31 | 1825.28 | 2242.42 | 2814.30 | 3530.99 | 4235.94 | 3492.40 | 2907.84 | 2728.14 | 2324.43 | 1595.40 | 1495.37 | 1477.08 |
| Coal mining | 104.19 | 162.48 | 207.34 | 263.47 | 297.21 | 388.11 | 425.97 | 420.91 | 465.02 | 435.06 | 439.48 | 395.54 | 359.89 | 372.69 |
| Oil & gas extraction | 1230.97 | 1003.94 | 1182.29 | 1447.40 | 1897.48 | 2445.88 | 3291.96 | 2687.12 | 2058.57 | 1940.44 | 1568.65 | 882.09 | 875.70 | 828.68 |
| Metal mining | 83.44 | 138.92 | 168.13 | 228.31 | 286.22 | 306.24 | 174.31 | 91.52 | 89.60 | 52.00 | 35.80 | 30.75 | 28.43 | 31.92 |
| Non-metallic minerals, except fuels | 212.15 | 241.96 | 267.52 | 303.24 | 333.40 | 390.75 | 343.70 | 292.86 | 294.65 | 300.63 | 280.50 | 287.02 | 231.35 | 243.89 |
| Construction | 530.37 | 558.67 | 623.21 | 696.91 | 799.11 | 810.40 | 801.40 | 728.87 | 487.46 | 487.74 | 608.77 | 553.69 | 380.21 | 352.73 |
| Manufacturing: | 340.09 | 393.19 | 412.00 | 431.12 | 416.81 | 396.20 | 411.39 | 398.12 | 373.13 | 374.04 | 345.44 | 362.43 | 363.57 | 399.62 |
| Nondurable goods: | 243.95 | 287.39 | 290.21 | 279.80 | 261.84 | 261.23 | 272.38 | 277.56 | 261.97 | 249.48 | 228.72 | 245.88 | 242.63 | 278.96 |
| Food and kindred products | 46.44 | 45.43 | 45.81 | 42.63 | 41.10 | 38.37 | 38.24 | 37.61 | 35.14 | 32.97 | 35.96 | 36.90 | 36.64 | 38.48 |
| Textile mill products | (L) | 0.01 | 0.02 | (L) | (L) | (L) | (L) | (L) | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 |
| Apparel and other textile products | 3.12 | 3.20 | 4.47 | 4.73 | 4.71 | 4.22 | 2.79 | 0.95 | 0.82 | 0.91 | 0.99 | 1.20 | 1.18 | 1.80 |
| Paper and allied products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | 0.28 | 0.06 | 0.13 | 0.12 | 0.05 | 0.03 | 0.04 |
| Printing and publishing | 21.77 | 24.26 | 26.12 | 28.12 | 31.13 | 32.59 | 34.06 | 34.43 | 34.80 | 34.74 | 35.42 | 34.39 | 33.26 | 39.50 |
| Chemicals and allied products | 15.92 | 17.66 | 19.35 | 19.31 | 19.65 | 18.87 | 19.56 | 18.02 | 15.50 | 15.40 | 17.77 | 20.92 | 25.36 | 33.60 |
| Petroleum and coal products | 154.26 | 194.11 | 191.34 | 180.73 | 161.17 | 163.27 | 173.34 | 182.58 | 171.98 | 161.80 | 134.82 | 147.84 | 140.99 | 159.33 |
| Tobacco manufactures | 0.02 | 0.02 | 0.01 | 0.03 | 0.01 | 0.01 | 0.02 | (L) | 0.01 | 0.01 | (L) | 0.02 | 0.02 | 0.02 |
| Rubber and misc. plastic products | 2.26 | 2.34 | 2.47 | 2.90 | 3.13 | 2.69 | 2.91 | 3.07 | 3.28 | 3.29 | 3.38 | 3.58 | 3.94 | 5.17 |
| Leather and leather products | (D) | (D) | (D) | (D) | (D) | (D) | (D) | 0.60 | 0.34 | 0.23 | 0.23 | 0.98 | 1.19 | 1.01 |
| Durable goods: | 96.14 | 105.80 | 121.79 | 151.33 | 154.97 | 134.97 | 139.02 | 120.55 | 111.16 | 124.66 | 116.71 | 116.55 | 120.94 | 120.66 |
| Lumber and wood products | 31.08 | 39.77 | 46.07 | 51.05 | 50.47 | 36.71 | 33.43 | 25.13 | 29.40 | 32.49 | 28.96 | 32.39 | 37.98 | 38.46 |
| Furniture and fixtures | 1.16 | 0.72 | 0.96 | 1.15 | 0.49 | 0.27 | 0.30 | (D) | (D) | 0.35 | 0.49 | 0.30 | 0.51 | 1.36 |
| Primary metal industries | 1.27 | 0.27 | 0.78 | 1.08 | 1.68 | 1.60 | 2.22 | (D) | (D) | 8.97 | 6.06 | 7.69 | 7.01 | 8.40 |
| Fabricated metal products | 11.45 | 9.37 | 9.93 | 13.16 | 17.09 | 17.93 | 17.69 | 14.71 | 12.12 | 12.35 | 13.38 | 12.29 | 12.58 | 12.65 |
| Machinery, except electrical | 17.01 | 18.34 | 24.25 | 32.78 | 33.17 | 33.75 | 40.16 | 35.12 | 23.28 | 24.56 | 23.28 | 21.76 | 20.83 | 21.69 |
| Electric and electronic equipment | 2.39 | 2.12 | 1.81 | 1.96 | 0.60 | 0.22 | 0.31 | 0.67 | 0.10 | 1.93 | 1.62 | 1.55 | 1.94 | 1.50 |
| Transportation equip., except mot. veh. | 2.00 | 1.66 | 1.81 | 2.11 | 1.87 | 1.93 | 2.40 | 1.79 | 2.17 | 2.42 | 2.78 | 3.54 | 4.06 | 4.56 |
| Motor vehicles and equipment | 0.16 | 0.25 | 0.25 | 0.44 | 0.70 | 0.59 | 0.34 | (D) | (D) | 0.10 | 0.20 | 0.16 | 0.16 | 0.21 |
| Stone, clay, and glass products | 25.83 | 29.46 | 31.67 | 42.97 | 44.73 | 38.13 | 37.62 | 36.85 | 37.86 | 37.08 | 36.22 | 32.83 | 31.72 | 25.44 |
| Instruments and related products | 2.21 | 2.02 | 2.37 | 2.67 | 2.70 | 2.30 | 1.88 | 1.74 | 1.73 | 1.63 | 1.11 | 1.09 | 1.08 | 2.70 |
| Miscellaneous manufacturing ind. | 1.57 | 1.82 | 1.89 | 1.97 | 1.47 | 1.54 | 2.69 | 2.36 | 2.11 | 2.69 | 2.61 | 2.95 | 3.08 | 3.70 |
| Transportation, communication, & public utilities: | 683.18 | 736.97 | 786.57 | 876.50 | 952.44 | 1016.74 | 1127.76 | 1114.79 | 1114.61 | 1149.64 | 1143.54 | 1088.90 | 1017.17 | 1038.37 |
| Railroad transportation | 130.44 | 152.76 | 158.97 | 179.91 | 201.34 | 210.33 | 211.03 | 182.70 | 192.73 | 208.46 | 197.68 | 179.20 | 174.42 | 176.82 |
| Trucking and warehousing | 120.51 | 125.67 | 131.47 | 153.57 | 172.30 | 190.75 | 212.55 | 186.19 | 165.31 | 172.61 | 163.93 | 146.85 | 148.14 | 155.01 |
| Water transportation | 0.25 | 0.36 | 0.67 | 0.76 | 0.20 | 0.19 | 0.30 | 0.29 | 0.31 | 0.25 | 0.17 | 0.11 | 0.03 | (D) |
| Other transportation: | 67.94 | 75.85 | 83.40 | 113.81 | 133.47 | 135.78 | 131.42 | 125.95 | 114.53 | 104.62 | 93.57 | 61.92 | 66.24 | (D) |
| Local and interurban passenger transit | 8.50 | 9.23 | 10.63 | 11.91 | 12.74 | 13.05 | 11.99 | 12.08 | 12.68 | 12.29 | 11.89 | 9.85 | 8.21 | (D) |
| Transportation by air | 9.51 | 9.79 | 11.69 | 13.91 | 13.86 | 15.91 | 16.27 | 16.18 | 15.80 | 14.70 | 11.11 | 9.29 | 10.83 | 12.18 |
| Pipelines, except natural gas | 47.23 | 53.22 | 55.53 | 81.00 | 100.43 | 102.18 | 97.13 | 91.71 | 79.37 | 70.62 | 64.12 | 36.25 | 41.34 | 40.65 |
| Transportation services | 2.70 | 3.61 | 5.54 | 6.99 | 6.43 | 4.64 | 6.04 | 5.98 | 6.69 | 7.01 | 6.46 | 6.53 | 5.87 | 7.78 |
| Communication | 133.30 | 148.47 | 153.17 | 168.83 | 178.21 | 188.92 | 201.46 | 190.43 | 187.69 | 164.70 | 157.46 | 150.20 | 143.10 | 138.85 |
| Electric, gas, and sanitary services | 230.74 | 233.87 | 257.88 | 258.62 | 266.93 | 290.77 | 371.01 | 429.23 | 454.04 | 499.00 | 530.73 | 550.61 | 485.23 | 498.92 |
| Wholesale trade | 216.82 | 233.97 | 266.05 | 309.84 | 348.26 | 392.99 | 480.54 | 441.63 | 364.12 | 378.97 | 368.91 | 307.27 | 259.09 | 248.51 |
| Retail trade | 543.62 | 593.88 | 640.18 | 699.39 | 726.65 | 706.77 | 716.81 | 713.54 | 679.44 | 679.76 | 677.03 | 625.54 | 581.69 | 577.63 |
| Finance, insurance, and real estate: | 371.67 | 465.98 | 549.63 | 673.31 | 623.03 | 570.58 | 552.61 | 490.02 | 526.49 | 519.36 | 532.33 | 499.55 | 537.01 | 474.82 |
| Banking and credit agencies | 73.04 | 78.84 | 92.09 | 114.74 | 129.15 | 130.06 | 132.33 | 130.66 | 143.78 | 135.67 | 141.61 | 127.17 | 119.33 | 120.57 |
| Other finance, insurance, and real est. | 298.63 | 387.13 | 457.54 | 558.57 | 493.89 | 440.52 | 420.28 | 359.36 | 382.71 | 383.69 | 390.71 | 372.38 | 417.69 | 354.26 |
| Services: | 527.58 | 583.89 | 629.25 | 729.57 | 784.31 | 848.31 | 830.13 | 815.97 | 762.17 | 790.18 | 796.12 | 807.09 | 799.42 | 818.97 |
| Hotels and other lodging places | 97.02 | 102.00 | 98.59 | 116.81 | 120.50 | 113.82 | 109.31 | 109.68 | 97.96 | 96.01 | 89.87 | 94.40 | 88.32 | 92.63 |
| Personal services | 32.73 | 38.16 | 39.95 | 42.51 | 41.77 | 44.38 | 42.07 | 45.19 | 42.25 | 42.45 | 49.37 | 48.03 | 46.19 | 47.32 |
| Private households | 8.65 | 9.46 | 9.70 | 9.48 | 8.96 | 8.35 | 8.35 | 8.63 | 8.94 | 9.26 | 8.94 | 8.62 | 8.09 | 7.71 |
| Business services | 55.57 | 64.45 | 75.72 | 95.25 | 122.57 | 139.03 | 128.60 | 127.45 | 101.57 | 109.67 | 105.82 | 97.88 | 91.94 | 87.54 |
| Auto repair, services, and garages | 48.84 | 51.20 | 57.37 | 64.27 | 65.96 | 70.24 | 71.23 | 64.95 | 57.63 | 59.59 | 62.37 | 58.23 | 57.64 | 63.26 |
| Miscellaneous repair services | 22.97 | 27.46 | 33.50 | 44.28 | 42.53 | 54.16 | 46.85 | 42.64 | 41.62 | 45.25 | 38.01 | 37.19 | 31.46 | 37.71 |
| Amusement and recreation services | 15.23 | 15.65 | 15.71 | 15.83 | 16.88 | 16.15 | 17.24 | 17.30 | 17.25 | 17.88 | 20.77 | 23.31 | 25.37 | 27.52 |
| Motion pictures | 3.79 | 5.64 | 4.34 | 5.32 | 3.98 | 3.41 | 2.77 | 2.91 | 2.57 | 2.85 | 3.67 | 4.00 | 3.57 | 3.70 |
| Health services | 104.50 | 110.88 | 115.94 | 124.94 | 131.42 | 144.94 | 150.11 | 156.10 | 159.14 | 163.36 | 168.93 | 179.91 | 196.48 | 195.81 |
| Legal services | 29.53 | 29.21 | 29.07 | 38.61 | 39.15 | 37.72 | 36.98 | 41.53 | 46.24 | 52.24 | 53.44 | 57.52 | 59.59 | 59.56 |
| Educational services | 6.80 | 7.01 | 6.99 | 7.29 | 7.34 | 8.09 | 7.45 | 8.02 | 8.53 | 9.69 | 9.79 | 9.50 | 10.08 | 11.41 |
| Social services & membership org's. | 47.27 | 57.10 | 64.02 | 72.87 | 77.79 | 87.01 | 86.65 | 91.61 | 95.04 | 99.51 | 103.15 | 102.00 | 105.71 | 112.09 |
| Miscellaneous professional services | 54.69 | 65.64 | 78.36 | 92.11 | 105.47 | 121.01 | 122.52 | 99.97 | 83.43 | 82.42 | 81.98 | 86.49 | 75.00 | 72.71 |
| GROSS INDUSTRIAL PRODUCT | 4866.77 | 5141.03 | 5759.17 | 6686.67 | 7495.43 | 8301.03 | 9185.11 | 8223.86 | 7245.38 | 7136.22 | 6821.92 | 5862.20 | 5463.21 | 5416.48 |
| GROSS FARM PRODUCT | 246.54 | 221.71 | 218.57 | 280.19 | 342.75 | 316.45 | 249.04 | 185.00 | 187.78 | 197.12 | 187.02 | 214.24 | 230.41 | 245.42 |
| GROSS GOVERNMENT PRODUCT | 773.99 | 836.44 | 872.78 | 922.25 | 929.31 | 1023.82 | 1067.38 | 1127.16 | 1216.07 | 1243.09 | 1280.33 | 1292.66 | 1243.50 | 1242.04 |
| TOTAL GROSS STATE PRODUCT | 5887.30 | 6199.19 | 6850.53 | 7889.11 | 8767.49 | 9641.31 | 10501.53 | 9536.02 | 8649.23 | 8576.43 | 8289.27 | 7369.09 | 6937.12 | 6903.94 |

*Totals may not add due to rounding of figures.*

*(D) - Not shown to avoid disclosure of confidential information. Estimates are included in totals.*

*(L) - Less than $5,000. Estimates are included in totals.*

## TABLE 5 - GROSS STATE PRODUCT BY MAJOR DIVISION: 1960-1974 (Millions of Current Dollars)

| DIVISION | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GROSS INDUSTRIAL PRODUCT | 850.8 | 858.4 | 878.4 | 895.5 | 932.5 | 953.8 | 982.4 | 1005.2 | 1114.9 | 1248.9 | 1317.7 | 1425.0 | 1575.3 | 1870.3 | 2438.5 |
| PERCENT OF TOTAL GSP | 80.5 | 79.9 | 79.2 | 78.6 | 79.3 | 78.4 | 77.5 | 75.8 | 78.0 | 78.5 | 77.7 | 77.4 | 76.1 | 75.9 | 80.5 |
| GROSS FARM PRODUCT | 90.0 | 89.0 | 96.0 | 97.3 | 80.0 | 93.3 | 106.9 | 119.9 | 94.6 | 105.3 | 113.2 | 121.2 | 166.2 | 224.8 | 184.3 |
| PERCENT OF TOTAL GSP | 8.5 | 8.3 | 8.7 | 8.5 | 6.8 | 7.7 | 8.4 | 9.0 | 6.6 | 6.6 | 6.7 | 6.6 | 8.0 | 9.1 | 6.1 |
| GROSS GOVERNMENT PRODUCT | 115.6 | 126.3 | 134.8 | 146.3 | 163.8 | 169.5 | 177.9 | 201.2 | 220.5 | 237.4 | 264.3 | 295.5 | 327.5 | 368.0 | 405.5 |
| PERCENT OF TOTAL GSP | 10.9 | 11.8 | 12.2 | 12.8 | 13.9 | 13.9 | 14.0 | 15.2 | 15.4 | 14.9 | 15.6 | 16.0 | 15.8 | 14.9 | 13.4 |
| TOTAL GROSS STATE PRODUCT | 1056.4 | 1073.8 | 1109.2 | 1139.1 | 1176.2 | 1216.5 | 1267.1 | 1326.3 | 1429.9 | 1591.5 | 1695.1 | 1841.8 | 2069.1 | 2463.1 | 3028.3 |

## TABLE 6 - GROSS STATE PRODUCT BY MAJOR DIVISION: 1975-1988 (Millions of Current Dollars)

| DIVISION | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GROSS INDUSTRIAL PRODUCT | 2886.0 | 3244.0 | 3875.9 | 4827.8 | 5891.4 | 7114.0 | 8634.0 | 8223.9 | 7528.0 | 7685.7 | 7565.5 | 6671.2 | 6413.8 | 6570.2 |
| PERCENT OF TOTAL GSP | 82.7 | 82.9 | 84.1 | 84.8 | 85.5 | 86.1 | 87.5 | 86.2 | 83.8 | 83.2 | 82.3 | 79.6 | 78.8 | 78.5 |
| GROSS FARM PRODUCT | 146.2 | 139.9 | 147.1 | 202.3 | 269.4 | 271.2 | 234.1 | 185.0 | 195.1 | 212.3 | 207.4 | 243.8 | 270.5 | 297.7 |
| PERCENT OF TOTAL GSP | 4.2 | 3.6 | 3.2 | 3.6 | 3.9 | 3.3 | 2.4 | 1.9 | 2.2 | 2.3 | 2.3 | 2.9 | 3.3 | 3.6 |
| GROSS GOVERNMENT PRODUCT | 459.0 | 527.8 | 587.4 | 665.9 | 730.4 | 877.4 | 1003.3 | 1127.2 | 1263.5 | 1338.8 | 1419.9 | 1471.0 | 1459.9 | 1506.6 |
| PERCENT OF TOTAL GSP | 13.1 | 13.5 | 12.7 | 11.7 | 10.6 | 10.6 | 10.2 | 11.8 | 14.1 | 14.5 | 15.4 | 17.5 | 17.9 | 18.0 |
| TOTAL GROSS STATE PRODUCT | 3491.2 | 3911.7 | 4610.4 | 5695.9 | 6891.3 | 8262.6 | 9871.4 | 9536.0 | 8986.6 | 9236.8 | 9192.8 | 8386.0 | 8144.2 | 8374.5 |

*Totals may not add due to rounding of figures.*

## TABLE 7 - GROSS INDUSTRIAL PRODUCT BY MAJOR SECTOR: 1960-1974 (Millions of Constant Dollars)

| SECTOR | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AG. SVC., FOREST., FISH., OTHER | 6.6 | 8.5 | 12.8 | 10.9 | 14.2 | 14.3 | 15.1 | 15.6 | 16.2 | 18.9 | 17.6 | 19.9 | 22.5 | 25.0 | 26.2 |
| PERCENT OF TOTAL GIP | 0.2 | 0.3 | 0.5 | 0.4 | 0.5 | 0.5 | 0.5 | 0.6 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.6 |
| MINING | 713.7 | 697.8 | 702.9 | 709.1 | 672.5 | 656.1 | 665.5 | 672.0 | 786.6 | 897.7 | 855.8 | 802.1 | 815.0 | 943.9 | 1512.1 |
| PERCENT OF TOTAL GIP | 25.9 | 25.4 | 25.5 | 25.7 | 23.7 | 23.2 | 23.7 | 24.0 | 26.6 | 28.6 | 27.3 | 25.0 | 24.1 | 25.0 | 33.5 |
| CONSTRUCTION | 327.6 | 279.9 | 251.7 | 263.5 | 274.5 | 236.0 | 221.3 | 220.2 | 236.4 | 231.1 | 244.8 | 276.7 | 326.3 | 428.0 | 526.1 |
| PERCENT OF TOTAL GIP | 11.9 | 10.2 | 9.1 | 9.5 | 9.7 | 8.4 | 7.9 | 7.9 | 8.0 | 7.4 | 7.8 | 8.6 | 9.6 | 11.3 | 11.6 |
| MANUFACTURING | 292.1 | 282.8 | 272.7 | 285.9 | 281.8 | 302.5 | 302.7 | 291.9 | 280.7 | 271.9 | 282.6 | 286.0 | 297.9 | 350.2 | 308.5 |
| PERCENT OF TOTAL GIP | 10.6 | 10.3 | 9.9 | 10.3 | 9.9 | 10.7 | 10.8 | 10.4 | 9.5 | 8.7 | 9.0 | 8.9 | 8.8 | 9.3 | 6.8 |
| TRANSPORT., COMM., & PUBLIC UTILS. | 433.7 | 463.8 | 465.3 | 479.5 | 505.6 | 503.8 | 488.2 | 476.7 | 492.9 | 502.0 | 510.7 | 536.3 | 568.7 | 608.3 | 630.5 |
| PERCENT OF TOTAL GIP | 15.8 | 16.9 | 16.9 | 17.3 | 17.8 | 17.9 | 17.4 | 17.0 | 16.7 | 16.0 | 16.3 | 16.7 | 16.8 | 16.1 | 14.0 |
| WHOLESALE TRADE | 133.4 | 135.8 | 140.4 | 114.8 | 132.5 | 124.8 | 124.5 | 127.5 | 133.6 | 132.7 | 133.7 | 144.7 | 151.3 | 161.5 | 202.0 |
| PERCENT OF TOTAL GIP | 4.8 | 4.9 | 5.1 | 4.2 | 4.7 | 4.4 | 4.4 | 4.6 | 4.5 | 4.2 | 4.3 | 4.5 | 4.5 | 4.3 | 4.5 |
| RETAIL TRADE | 317.2 | 324.1 | 334.7 | 335.8 | 355.0 | 359.8 | 353.8 | 363.9 | 379.1 | 396.3 | 400.3 | 420.4 | 445.5 | 475.8 | 485.2 |
| PERCENT OF TOTAL GIP | 11.5 | 11.8 | 12.2 | 12.1 | 12.5 | 12.7 | 12.6 | 13.0 | 12.8 | 12.6 | 12.8 | 13.1 | 13.2 | 12.6 | 10.7 |
| FINANCE, INSURANCE, & REAL ESTATE | 246.0 | 255.9 | 265.1 | 267.6 | 283.0 | 293.7 | 299.6 | 298.5 | 291.5 | 321.9 | 318.5 | 334.0 | 347.5 | 349.7 | 347.0 |
| PERCENT OF TOTAL GIP | 8.9 | 9.3 | 9.6 | 9.7 | 10.0 | 10.4 | 10.7 | 10.7 | 9.9 | 10.3 | 10.2 | 10.4 | 10.3 | 9.3 | 7.7 |
| SERVICES | 282.9 | 302.7 | 308.1 | 296.8 | 315.2 | 331.0 | 336.0 | 333.9 | 340.2 | 365.3 | 373.5 | 389.3 | 413.1 | 436.2 | 478.2 |
| PERCENT OF TOTAL GIP | 10.3 | 11.0 | 11.2 | 10.7 | 11.1 | 11.7 | 12.0 | 11.9 | 11.5 | 11.6 | 11.9 | 12.1 | 12.2 | 11.5 | 10.6 |
| TOTAL GROSS INDUSTRIAL PRODUCT | 2753.3 | 2751.4 | 2753.5 | 2763.9 | 2834.2 | 2821.9 | 2806.8 | 2800.1 | 2957.2 | 3137.9 | 3137.3 | 3209.5 | 3387.8 | 3778.4 | 4515.8 |

## TABLE 8 - GROSS INDUSTRIAL PRODUCT BY MAJOR SECTOR: 1975-1988 (Millions of Constant Dollars)

| SECTOR | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AG. SVC., FOREST., FISH., OTHER | 22.7 | 27.2 | 29.0 | 28.6 | 30.5 | 28.1 | 28.5 | 28.5 | 30.1 | 28.4 | 25.4 | 22.3 | 29.7 | 28.7 |
| PERCENT OF TOTAL GIP | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 |
| MINING | 1630.8 | 1547.3 | 1825.3 | 2242.4 | 2814.3 | 3531.0 | 4235.9 | 3492.4 | 2907.8 | 2728.1 | 2324.4 | 1595.4 | 1495.4 | 1477.1 |
| PERCENT OF TOTAL GIP | 33.5 | 30.1 | 31.7 | 33.5 | 37.5 | 42.5 | 46.1 | 42.5 | 40.1 | 38.2 | 34.1 | 27.2 | 27.4 | 27.3 |
| CONSTRUCTION | 530.4 | 558.7 | 623.2 | 696.9 | 799.1 | 810.4 | 801.4 | 728.9 | 487.5 | 487.7 | 608.8 | 553.7 | 380.2 | 352.7 |
| PERCENT OF TOTAL GIP | 10.9 | 10.9 | 10.8 | 10.4 | 10.7 | 9.8 | 8.7 | 8.9 | 6.7 | 6.8 | 8.9 | 9.4 | 7.0 | 6.5 |
| MANUFACTURING | 340.1 | 393.2 | 412.0 | 431.1 | 416.8 | 396.2 | 411.4 | 398.1 | 373.1 | 374.0 | 345.4 | 362.4 | 363.6 | 399.6 |
| PERCENT OF TOTAL GIP | 7.0 | 7.6 | 7.2 | 6.4 | 5.6 | 4.8 | 4.5 | 4.8 | 5.1 | 5.2 | 5.1 | 6.2 | 6.7 | 7.4 |
| TRANSPORT., COMM., & PUBLIC UTILS. | 683.2 | 737.0 | 785.6 | 875.5 | 952.4 | 1016.7 | 1127.8 | 1114.8 | 1114.6 | 1149.6 | 1143.5 | 1088.9 | 1017.2 | 1038.4 |
| PERCENT OF TOTAL GIP | 14.0 | 14.3 | 13.6 | 13.1 | 12.7 | 12.2 | 12.3 | 13.6 | 15.4 | 16.1 | 16.8 | 18.6 | 18.6 | 19.2 |
| WHOLESALE TRADE | 216.8 | 234.0 | 265.1 | 309.8 | 348.3 | 393.0 | 480.5 | 441.6 | 364.1 | 379.0 | 368.9 | 307.3 | 259.1 | 248.5 |
| PERCENT OF TOTAL GIP | 4.5 | 4.6 | 4.6 | 4.6 | 4.6 | 4.7 | 5.2 | 5.4 | 5.0 | 5.3 | 5.4 | 5.2 | 4.7 | 4.6 |
| RETAIL TRADE | 543.6 | 593.9 | 640.2 | 699.4 | 726.7 | 706.8 | 716.8 | 713.5 | 679.4 | 679.8 | 677.0 | 625.5 | 581.7 | 577.6 |
| PERCENT OF TOTAL GIP | 11.2 | 11.6 | 11.1 | 10.5 | 9.7 | 8.5 | 7.8 | 8.7 | 9.4 | 9.5 | 9.9 | 10.7 | 10.6 | 10.7 |
| FINANCE, INSURANCE, & REAL ESTATE | 371.7 | 466.0 | 549.6 | 673.3 | 623.0 | 570.6 | 552.6 | 490.0 | 526.5 | 519.4 | 532.3 | 499.6 | 537.0 | 474.8 |
| PERCENT OF TOTAL GIP | 7.6 | 9.1 | 9.5 | 10.1 | 8.3 | 6.9 | 6.0 | 6.0 | 7.3 | 7.3 | 7.8 | 8.5 | 9.8 | 8.8 |
| SERVICES | 527.6 | 583.9 | 629.3 | 729.6 | 784.3 | 848.3 | 830.1 | 816.0 | 762.2 | 790.2 | 796.1 | 807.1 | 799.4 | 819.0 |
| PERCENT OF TOTAL GIP | 10.8 | 11.4 | 10.9 | 10.9 | 10.5 | 10.2 | 9.0 | 9.9 | 10.5 | 11.1 | 11.7 | 13.8 | 14.6 | 15.1 |
| TOTAL GROSS INDUSTRIAL PRODUCT | 4866.8 | 5141.0 | 5759.2 | 6686.7 | 7495.4 | 8301.0 | 9185.1 | 8223.9 | 7245.4 | 7136.2 | 6821.9 | 5862.2 | 5463.2 | 5416.5 |

*Totals may not add due to rounding of figures.*

GROSS STATE PRODUCT BY MAJOR DIVISION
PERCENT OF TOTAL GSP: 1988

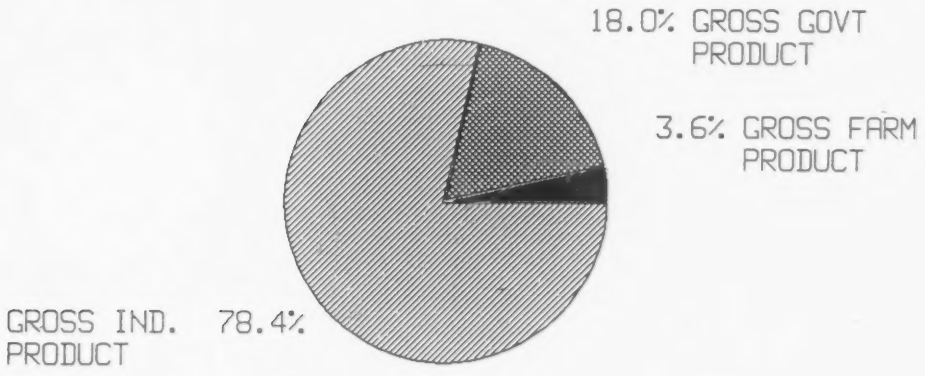



FIGURE 1

GROSS INDUSTRIAL PRODUCT BY MAJOR SECTOR
PERCENT OF TOTAL GIP: 1988

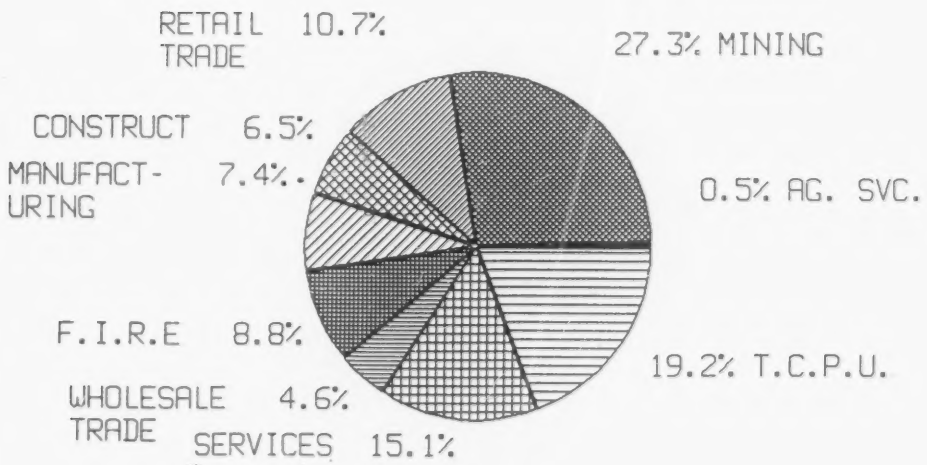



FIGURE 2

# GROSS STATE PRODUCT BY MAJOR DIVISION
## 1960 THROUGH 1988
## CURRENT DOLLARS

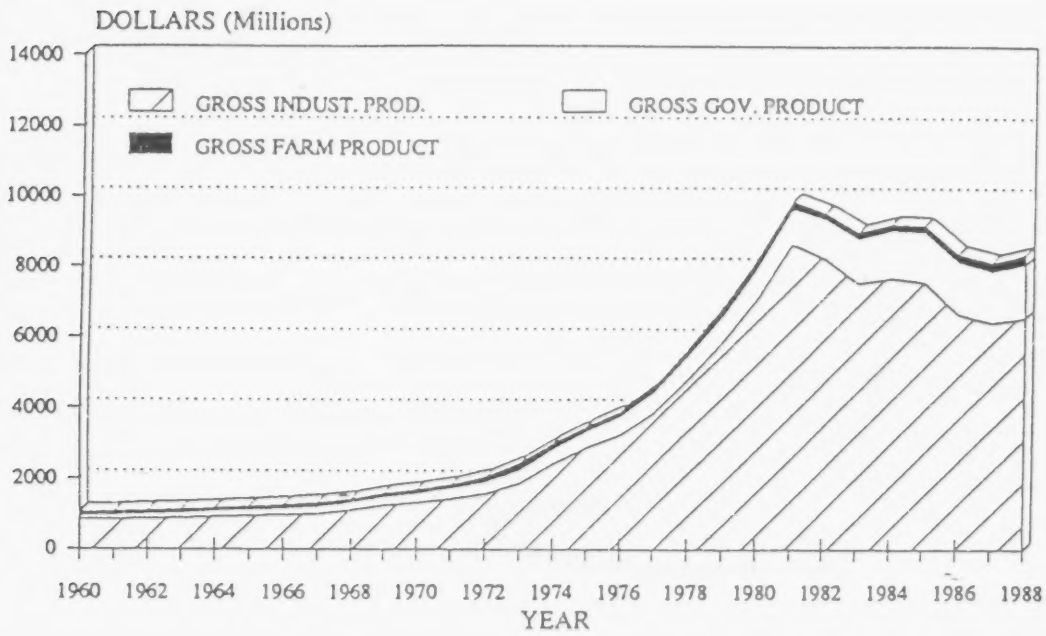



FIGURE 3

# A Synopsis of the Yellowstone, Grand Teton and Rockefeller Parkway Winter Use Plan

Near the end of 1990 the National Park Service finalized a comprehensive plan which will establish management policies for winter use in Yellowstone National Park, Grand Teton National Park, and John D. Rockefeller, Jr. Parkway. The winter use season runs from December 1 through March 31. A brief synopsis of this plan is relevant considering the impact tourism plays in Wyoming's economy year round. While the plan does not include detailed implementation strategies it is "intended to guide overall management of visitor use and identify staffing and facility needs to accommodate winter use in the three-park area." The document is fairly lengthy (almost 120 pages) covering subjects as diverse as visitor experience to administrative support. This brief look at the actual management objectives will serve to give the reader a feel for the document.

## Visitor Experience

**Management Objective**: "Preserve and emphasize the national park experience of viewing world-renowned scenery, major concentrations of unique and unusual geothermal features, extensive populations of free-roaming wildlife, and nationally significant historic features in Yellowstone, Grand Teton, and Rockefeller Parkway during the winter."

Since individuals require different forms of experiences and activities an attempt will be made by park managers to minimize user conflicts by zoning various geographic areas. Use will differ in each of three zones. The smallest zone in the park will be the developed zone which will include facilities for visitor use (lodging, restaurants, visitor centers etc), administrative needs, and major park roads. Visitor use will be highest in this zone.

The largest area will be the wilderness area where winter use will be very low. The only facilities in this area will be ungroomed ski trails. Machines will not be used in this zone. Visitor use will be very low and facilities extremely limited.

The second largest zone, the natural zone, is a transitional region between the first 2 zones. Most of this zone will not be open to grooming but the ski trails that follow summer roads will be marked and groomed. There will be no visitor use of snowmachines in this area. Winter use in this area will be lower than in the developed zone but higher than the wilderness zone.

Additional restrictions may be established in any zone should it be necessary to protect park resources. Furthermore, "because there is no wilderness recommendation for the Rockefeller Parkway, none of its lands are included in this zone. If this status changes, the zoning will automatically be revised to place all recommended wilderness in the wilderness zone. Any revisions to the wilderness proposals for Yellowstone and Grand Teton will also automatically revise the boundaries of this zone."

## Use Levels/Capacities

**Management Objective**: "Accommodate modest levels of use forecast for the next ten years, and establish a process for managing future increases in winter use to keep impacts within prescribed limits."

This provisions calls for the National Park Service to develop a *visitor use management process* for the Yellowstone/Grand Teton National Parks, the purpose of which is to keep human impact within acceptable limits.

This program will involve monitoring areas of special environmental concern and "it will be a continuous process of redefining objectives, monitoring impact indicators, and adjusting management actions for specific areas and uses in the parks to keep impacts within prescribed limits."

The visitor use management process will be initiated once forecasted use levels are reached or if growth occurs more rapidly than expected. Also, the process will help identify visitor impact problems.

## Wildlife Effects

**Management Objective**: Protect wildlife from unacceptable impacts caused by winter visitor use.

The objective here is to minimize the effect of winter visitor use on wildlife. Through the use of the visitor use management process described above, park managers can determine the location of sensitive areas and direct visitor traffic away from those areas. Park managers can channel traffic away from sensitive areas by limiting use levels or closing off areas for temporary periods or the entire season. Not plowing parking areas, omitting sensitive areas from the maps and guides, and marking trails which lead away from sensitive areas are some other possible actions.

The plan calls for flexibility in this area. Levels of use may be limited based on variations in snow accumulations, animal movements, or nesting periods. These restrictions will be reviewed annually and a decision made as to whether modification is needed.

## Plowed Road Access and Staging Areas

**Management Objective**: "Provide winter automobile access to support a spectrum of winter activities, ensuring opportunities for winter scenic driving and access to the parks' snow roads and ski trails."

The Park Service will continue to plow:

-road between Gardiner and Cooke City
-US Highway 191
-road from Moran to the parking area near Flagg Ranch

Designated snow roads will not be plowed. Staging areas for the snow road systems in the park will be located in various spots throughout. Locations of staging areas are as follows:

-Mammoth Terrace (entrance from the north along US 89)
-A new area near Pahaska (from the east along US 20 through Cody)
-Existing and expanded parking near Flagg Ranch (snow roads to Yellowstone and Rockefeller Parkway from the south)
-Cottonwood Creek staging area (snow roads to Grand Teton from the south)
-The community of West Yellowstone will be encouraged to create parking for oversnow access to Yellowstone for individuals traveling from the west.

## Snow Machine Use

### Continental Divide Snowmobile Trail

**Management Objective**: "Allow persons using the state-proposed Continental Divide snowmobile trail to travel through the parks and experience the outstanding scenery, geothermal features, and wildlife populations on a trail that is consistent with NPS management policies."

A snowmobile trail is being established in the park to allow individuals traveling the entire Continental Divide to pass through the park. There are several provisions and specific actions associated with this trail. The trail will follow existing roads and snowmobiles will be allowed only on designated routes and frozen water that are used by motorized vehicles during other seasons. Use of this trail will be closely

monitored. Should it be determined use of this trail is adversely effecting the Park, an option of shuttling snowmachines on trailers will be implemented. Staging for this trail will be near Flagg Ranch as well as a small area (for noncommercial users) at Jackson Lake Lodge.

The new Continental Divide trail will follow the route of US 89/287 (between the east boundary of Grand Teton and the staging area near Flagg Ranch). Between Flagg Ranch and West Yellowstone the trail will follow existing designated snow roads.

**Other Snowmachine Areas**

**Management - Objective**: "Provide opportunities for snowmachine uses that promote the desired visitor experience, protect park resources, and comply with the NPS snowmobile policy."

Snowmobiling will be allowed only on roadways and the frozen surface of Jackson Lake. A major change will be the closing of the Potholes snowmobile area as soon as possible. All existing snow roads will remain open to use. Snow roads in Yellowstone will be groomed, however, snow roads in Grand Teton and Rockefeller Parkway will remain ungroomed. A new trail will connect the Continental Divide snowmobile trail to snow roads on Teton park road and Jenny Lake road.

A permit system will exist for snow planes, which will be restricted to Jackson Lake. Snow planes registered after this plan must meet snowmobile noise standards (78 decibels on the A-weighted scale). Snowplanes previously registered must meet a noise standard of 86 decibels.

Commercial snowmobile tours will be managed. Demand for this activity does not indicate a need to authorize additional commercial snowmobile tours at this time.

## Snow Coaches

**Management Objective**: "Provide snow coach service at a reasonable cost to visitors as an alternative to snowmobile and ski access to the Yellowstone interior."

A slight increase in snow coach use is proposed in this plan. Snow coach routes in the park will be maintained at current levels including no new snow coach service to the east gate of Yellowstone. No new routes are planned, however, future considerations may occur if the visitor use management process uncovers a need.

## Noise

**Management Objective**: "Reduce noise levels while allowing snowmachine access to park features and developed areas."

Existing noise standards will be maintained, aided by additional equipment used to monitor noisy machines. Speed limits will be enforced for snowmachines. As part of the visitor use management process a noise monitoring program will help identify problem areas and define management strategies to reduce noise impact.

## Skiing, Snowshoeing, and Hiking.

**Management Objective**: "Encourage nonmechanized forms of travel, such as ski touring, snowshoeing, and hiking, that allow visitors to leave the plowed roads, snow roads, and developed areas and to experience the outstanding park resources and the extensive opportunities for quiet and solitude of the backcountry in winter."

Ski trails may be groomed if they follow summer roads. This means that most the natural zone and all of the wilderness zone will not be groomed. Ski trails outside the wilderness areas will be well marked. Activities will be restricted in sensitive Park areas and in areas where safety hazards exists.

## Concessions

### Lodging/Food Service

**Management Objective**: "Provide the minimum quantity of accommodations and services necessary to facilitate the desired high-quality visitor experience."

Existing winter overnight capacities will not be increased in the park. The following provisions are recommended:

-The Snow Lodge at Old Faithful will be rehabitated or removed and replaced.
-Lodging at Canyon Village will not be available for winter use.
-New facilities at Flagg Ranch will be redeveloped on the bench above and north of the existing site. This will increase usable units from 30 to 150, and should accommodate increased use generated by the Continental Divide snowmobile trail.

Future proposals for additional winter lodging will be considered under the visitor use management process. It is generally assumed that demand for winter lodging will be met by the private sector outside the park.

### Gas

**Management Objective**: "Provide dependable supplies of gasoline for sale at existing developed areas in the park to serve snowmobile travelers throughout the winter."

Gasoline will be available at Mammoth, Canyon, Old Faithful, Flagg Ranch, and Signal Mountain. Additional existing stations may be opened (such as the Jackson Lake Lodge station) if demand is sufficient.

## National Park Service Visitor Facilities

### Warming Huts

**Management Objective**: "Provide warming huts at reasonable distances along the snow road system to increase safety, enhance interpretation, and improve the visitor experience."

Warming huts with food and beverages will be located at Madison, Old Faithful, and Canyon. Additional huts will be located at West Thumb, Norris (new facility), Indian Creek, and Lake/Fishing Bridge.

### Interpretive Facilities and Services

**Management Objective**: "Interpret the outstanding natural and cultural resources under winter conditions in the parks, and provide essential information, orientation, and safety messages to park visitors."

A new visitor center at Canyon will join centers at Old Faithful, Mammoth, and Moose. Interpretive information will also be available at all major stopping points and warming huts. Summer walkways will be available but will not be cleared of snow.

### Camping Areas

**Management Objective**: "Provide a spectrum of winter camping opportunities in the parks."

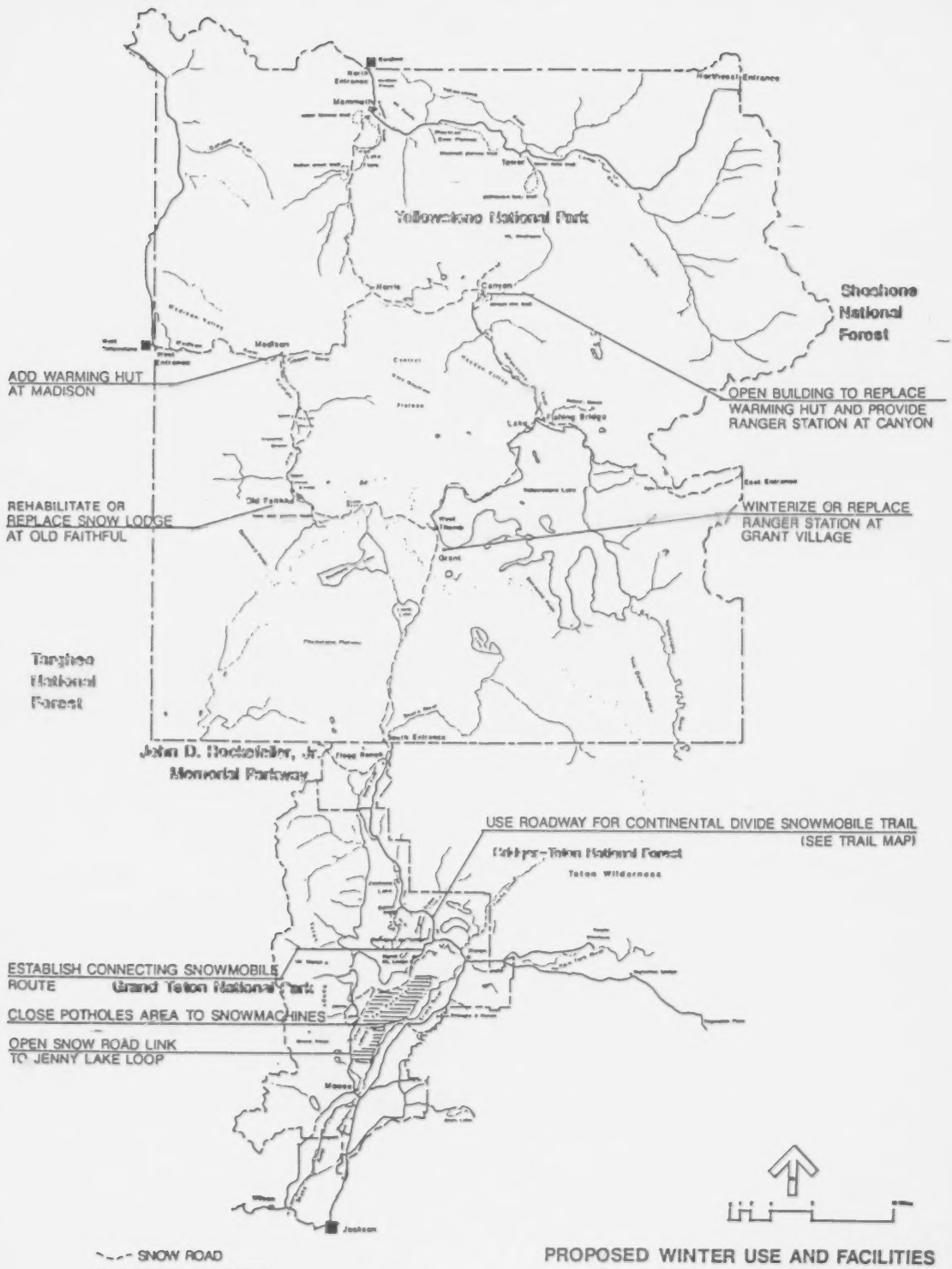
Backcountry camping permits will be available. Additional camping facilities will be available at Mammoth and Colter Bay and at other developed campgrounds accessible by snow roads if vault toilets or other year-round restrooms are available.

The Winter Use Plan also provides objectives for Administrative support such as ranger stations, employee housing, maintenance facilities, emergency services, and staffing. Three alternatives to the plan were considered, one which would reduce use levels and facilities, one to increase use levels and facilities, and a third option which would require no special winter use plan but keep management practices as they are now.

During the review period for the draft of this document support and opposition was heard for the plan, as well as the alternatives. The final plan has elements from each of the alternatives.

The Winter Use Plan Environmental Assessment is much more comprehensive than what is presented here. Interested readers are encouraged to examine this document. It includes a look at existing visitor use and National Park Service facilities, an expanded look at the Alternative Plans, Environmental Consequences of the plan, and many maps and tables which help the reader put information into perspective.

Terry Haven
Editor
Survey Research Center
University of Wyoming

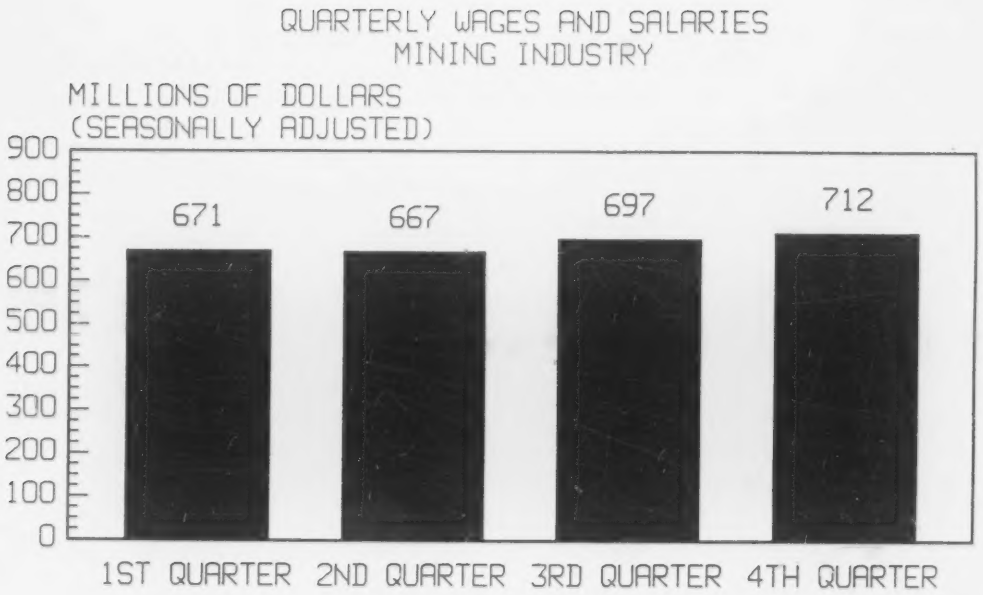

Gallatin National Forest
Yellowstone National Park
Shoshone National Forest
ADD WARMING HUT AT MADISON
OPEN BUILDING TO REPLACE WARMING HUT AND PROVIDE RANGER STATION AT CANYON
REHABILITATE OR REPLACE SNOW LODGE AT OLD FAITHFUL
WINTERIZE OR REPLACE RANGER STATION AT GRANT VILLAGE
Targhee National Forest
John D. Rockefeller, Jr. Memorial Parkway
USE ROADWAY FOR CONTINENTAL DIVIDE SNOWMOBILE TRAIL (SEE TRAIL MAP)
Bridger-Teton National Forest
Teton Wilderness
ESTABLISH CONNECTING SNOWMOBILE ROUTE
Grand Teton National Park
CLOSE POTHOLES AREA TO SNOWMACHINES
OPEN SNOW ROAD LINK TO JENNY LAKE LOOP
SNOW ROAD
GROOMED SKI TRAIL

PROPOSED WINTER USE AND FACILITIES

Yellowstone National Park, Grand Teton National Park, John D. Rockefeller Jr. Memorial Parkway

United States Department of the Interior / National Park Service

# Economic Changes



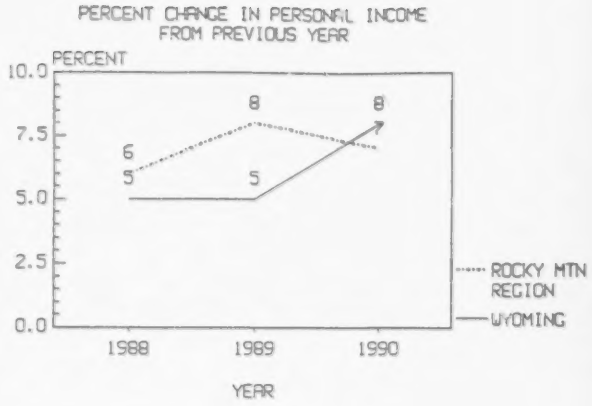

SOURCE BUREAU OF ECONOMIC ANALYSIS
APRIL 1991

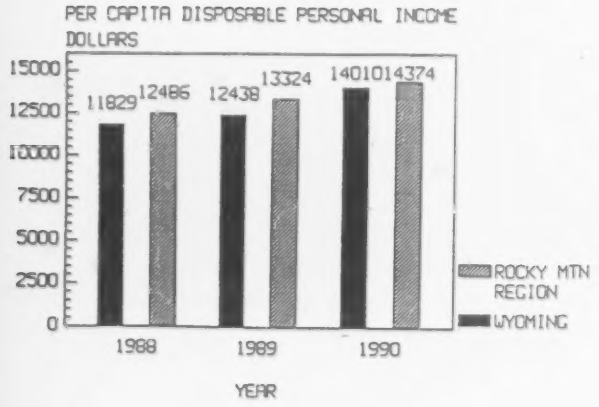
## ECONOMIC CHANGES

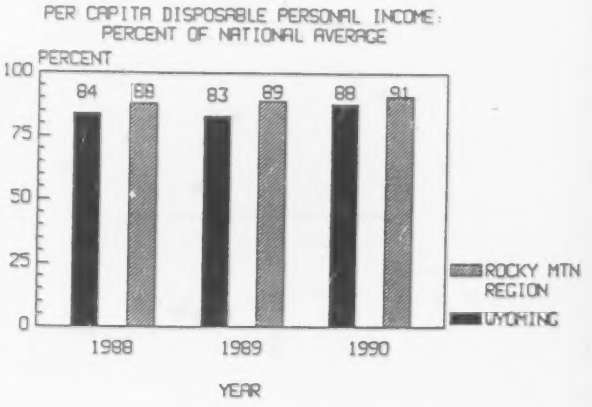
The Bureau of Economic Analysis, a division of the United States Department of Commerce, has released data on per capita personal income through 1990. Presented here is information from 1988 to 1990, however, the report contains historical statistics from 1948.

From 1988 to 1990 Wyoming's per capita disposable personal income increased $2181.00. This compared to an increase of $1888.00 for the Rocky Mountain Region as a whole and a $1769.00 increase for the United States.

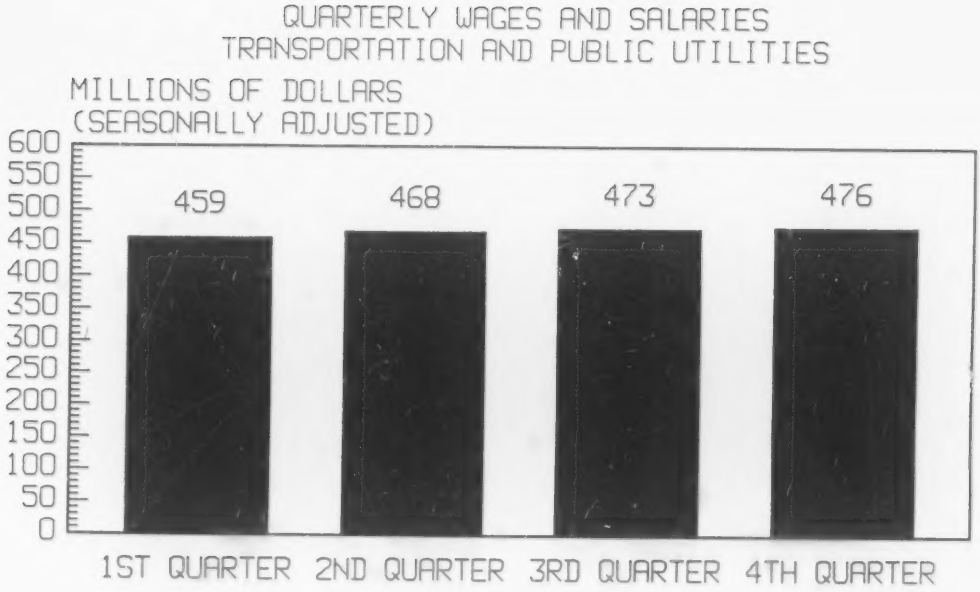
The 1990 figures are based on 1990 population counts which are subject to possible corrections for undercount or overcount. The U.S. Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, no later than July 15, 1991. For years prior to 1990, the figures are based on Bureau of the Census midyear population estimates. The 1988 and 1989 estimates have not been revised to reflect the 1990 population counts.



# State Data




SOURCE: BUREAU OF ECONOMIC ANALYSIS
APRIL 1991

Table 1: Agriculture[1]

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Timber Cut in Wyoming National Forests (MBF) | 5860. | 39416. | 54863. | 23488. | 6218. | 37522. | 46222. | 26418. | 65442. | 31445. | 43993. | 26199. |
| Price Indices[2] (1967=100) | | | | | | | | | | | | |
| 2. Wyoming Crops, Prices Received-Latest | 244. | 323. | 322. | 349. | 363. | 313. | 336. | 349. | 347. | 263. | 271. | 276. |
| 3. Wyoming Crops, Prices Received-Average | 234. | 302. | 323. | 344. | 362. | 336. | 329. | 349. | 346. | 313. | 273. | 272. |
| 4. U.S. Crops, Prices Received-Latest | 249. | 260. | 262. | 266. | 275. | 243. | 244. | 248. | 301. | 236. | 234. | 243. |
| 5. U.S. Crops, Prices Received-Average | 230. | 262. | 260. | 264. | 273. | 251. | 245. | 268. | 271. | 243. | 234. | 255. |
| 6. Wyoming, All Commodities, Prices Received-Latest | 260. | 313. | 292. | 324. | 301. | 310. | 298. | 320. | 313. | 301. | 291. | 307. |
| 7. Wyoming, All Commodities, Prices Received-Average | 280. | 295. | 300. | 311. | 308. | 311. | 299. | 316. | 315. | 303. | 295. | 292. |
| 8. U.S. All Commodities, Prices Received-Latest | 253. | 264. | 265. | 274. | 270. | 262. | 272. | 274. | 277. | 271. | 264. | 270. |
| 9. U.S., All Commodities, Prices Received-Average | 246. | 263. | 263. | 275. | 271. | 265. | 269. | 277. | 278. | 274. | 266. | 266. |
| 10. Wyoming Livestock, Prices Received-Latest | 265. | 310. | 283. | 316. | 283. | 309. | 286. | 311. | 303. | 313. | 297. | 316. |
| 11. Wyoming Livestock, Prices Received-Average | 294. | 293. | 293. | 309. | 292. | 303. | 289. | 306. | 306. | 300. | 301. | 297. |
| 12. U.S. Livestock, Prices Received-Latest | 257. | 268. | 269. | 281. | 264. | 279. | 297. | 299. | 250. | 303. | 291. | 296. |
| 13. U.S. Livestock, Prices Received-Average | 259. | 264. | 267. | 284. | 269. | 278. | 290. | 285. | 282. | 302. | 294. | 274. |
| 14. Prices Paid by U.S. Farmers-Average | 348. | 352. | 354. | 359. | 361. | 361. | 365. | 281. | 372. | 380. | 381. | 384. |

[1]First time readers of WQU should refer to the "Format" page (in back) for an explanation of abbreviations and table formats.
[2]The index for the last month (latest) of each quarter, along with the average of the three monthly indices of each quarter.

Sources: Series 1: United States Forest Service. "Timber Cut and Sold, Convertible Products." Region 2 and 4 reports published quarterly.
Series 2-15: Wyoming Crop and Livestock Reporting Service. Bi-weekly Ag Statistics.

Table 2: Banking and Finance

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total Bank Loans and Leases Financing Receivables (T$) | 1787542 | 1777474 | 1758410 | 1740029 | 1793438 | 1787592 | 1782338 | 1848557 | 1944633 | 1990127 | 2069101 | 2025762 |
| 2. Total Bank Deposits (T$) | 3705311 | 3712403 | 3753325 | 3623495 | 3621158 | 3633097 | 3838374 | 3768344 | 3864849 | 4018391 | 4129695 | 4029863 |
| 3. Total Non-Interest-Bearing Deposits (T$) | 564608 | 572367 | 577610 | 525702 | 549281 | 559276 | 648397 | 542168 | 555941 | 585554 | 625165 | 3466704 |
| 4. Savings and Loan Mortgage Loans (T$)[1] | 740954 | 726300 | 711602 | 719240 | 696415 | 617166 | 636718 | 431583 | 418552 | 354447 | 330883 | INA |
| 5. Savings and Loan Deposits (T$) | 1107268 | 1107961 | 1070072 | 1032814 | 988180 | 952120 | 962666 | 945644 | 908386 | 767458 | 708655 | INA |
| 6. Prime Interest Rate[2] | 9.00 | 10.00 | 10.50 | 11.50 | 11.07 | 10.50 | 10.50 | 10.0 | 10.0 | 10.0 | 10.0 | 9.00 |

[1]Only members of the Federal Home Loan Bank Board are included. Indicates amount at the end of the quarter.
[2]Prime rate charged by banks on short-term business loans. Rate is for last month of the quarter.

Sources: Series 1-3: Office of the State Examiner of Wyoming, Abstract Report of State and National Banks in Wyoming, published quarterly.
Series 4 and 5: Federal Home Bank of Seattle, Monthly Report. Comparative statistical analysis of member institutions.
Series 6: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 3: Business Conditions

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Domestic Corporations | 298 | 246 | 221 | 284 | 302 | 236 | 276 | 316 | 355 | 353 | 365 | 398 |
| 2. New Foreign Corporations | 196 | 208 | 232 | 218 | 249 | 196 | 208 | 196 | 262 | 214 | 231 | 201 |
| 3. Total New Corporations | 494 | 454 | 453 | 502 | 551 | 432 | 484 | 512 | 617 | 567 | 596 | 599 |
| 4. Business Failures | 52 | 34 | 32 | 31 | 30 | 24 | 25 | 31 | 28 | 19 | INA | INA |
| 5. Value of Business Failures ($) | 3906790 | 28339514 | 36551338 | 3120102 | 7852143 | 3591064 | 1998791 | 2914000 | 5578685 | 2072828 | INA | INA |
| 6. Personal Bankruptcies | 351 | 306 | 306 | 274 | 336 | 287 | 285 | 237 | 362 | 252 | INA | INA |

Sources: Series 1-3: Secretary of State. New and Foreign Corporations. Monthly report.
Series 4-6: Cheyenne Credit Bureau. Wyoming bankruptcy cases, business failures, and value of failures. Weekly publication.

Table 4: Construction

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Residential Dwelling Units | 449 | 359 | 291 | 233 | 289 | 401 | 264 | 394 | 466 | 614 | 463 | 412 |
| 2. Value of Residential Dwellings Constructed (M$) | 37.3 | 31.3 | 22.6 | 18.2 | 25.0 | 34.7 | 23.8 | 34.7 | 46.2 | 54.8 | 43.9 | 36.4 |
| 3. Value of Nonresidential Construction (M$) | 35.2 | 6.9 | 10.2 | 10.9 | 17.1 | 23.6 | 34.6 | 15.5 | 39.4 | 30.2 | 21.0 | 17.9 |
| 4. Building Permits Issued in Selected Wyoming Cities | 2763 | 2220 | 2082 | 1578 | 2806 | 2663 | 1996 | 1695 | 2634 | 2558 | 1885 | 1652 |
| 5. Value of Authorized Construction (T$) | 25330 | 21878 | 18071 | 8866 | 24528 | 22760 | 27343 | 16011 | 37542 | 29331 | 20714 | 24818 |
| 6. Mortgage Interest Rate[1] | 8.72 | 8.90 | 9.03 | 9.66 | 10.09 | 9.87 | 9.70 | 9.70 | 9.80 | 9.60 | 9.61 | 9.16 |

[1]Conventional first mortgage for new home purchase. U.S. average for last month of quarter.

Sources: Series 1-3: F.W. Dodge Division of McGraw-Hill. "Dodge Local Construction Potentials." Published monthly.
Series 4-5: Survey Research Center. "Local Construction Reports." Survey of authorized construction in selected cities conducted monthly.
Series 6: U.S. Department of Comerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 5: Consumers

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Truck Registrations | 3508 | 3203 | 3227 | 3086 | 3734 | 3775 | 3344 | 3474 | 3697 | 2986 | 2989 | NA |
| 2. New Car Registrations | 3147 | 2969 | 2849 | 2538 | 3341 | 3412 | 2409 | 2352 | 2607 | 2438 | 2149 | NA |
| 3. Wyoming Personal Income (M$) | 6660 | 6628 | 6684 | 6802 | 6851 | 6899 | 7058 | 7248 | 7361 | 7471 | 7672 | NA |
| 4. U.S. Disposable Income (B$) | 3422 | 3512 | 3587 | 3690 | 3711 | 3743 | 3800 | 3888 | 3926 | 3951 | 4002 | 4017 |
| 5. U.S. Personal Income (M$) | 4021869 | 4095382 | 4175632 | 4284521 | 4344107 | 4384651 | 4456325 | 4560370 | 4623373 | 4683100 | 4721376 | NA |
| 6. Latest U.S. Consumer Price Index (1982-1984 = 100)[1,2] | 116.7 | 118.5 | 119.2 | 120.8 | 122.8 | 123.6 | 124.6 | 127.1 | 128.3 | 131.1 | 132.2 | 133.0 |
| 7. Quarter's Average U.S. CPI | 116.7 | 117.8 | 119.5 | 120.2 | 122.4 | 123.3 | 124.4 | 127.5 | 127.7 | 129.9 | 132.2 | 132.9 |
| 8. Liquor Sales (T$) | 6714 | 7041 | 8368 | 5530 | 6747 | 7269 | 7746 | 5729 | 7036 | 7916 | 8643 | 6173 |

[1]Number shown is for the last month of the quarter. CPI shown is the index for wage earners and clerical workers.

[2]Beginning January 1987, the consumer price index, previously expressed on a base of 1967=100, has been rebased to 1982-1984=100. Selection of the 1982-1984 period was made to coincide with the updated expenditure weights, which are abased upon data tablulated from the Consumer Expenditure Surveys for 1982, 1983, and 1984. Historical data on the new base or additional information regarding these changes is available from the Bureau of Labor Statistics, Washington, D.C. 20212.

Sources: Series 1-2: R.L. Polk and Company Motor Statistical Division. "National New Vehicle Registration Service." Published monthly.
Series 3-4: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published quarterly.
Series 5-7: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.
Series 8: Wyoming Liquor Commission. Sales data are reported to SRC.

Table 6: Employment and Labor[1]

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Civilian Labor Force | 232589 | 235250 | 231426 | 235108 | 238973 | 242749 | 239173 | 241276 | 245354 | 245287 | 243179 | 241223 |
| 2. Employment | 219454 | 222072 | 216552 | 217688 | 224543 | 228035 | 225734 | 226438 | 233190 | 235389 | 230014 | 224834 |
| 3. Unemployment | 13135 | 13178 | 14874 | 17418 | 14431 | 14714 | 13438 | 14838 | 12164 | 9899 | 13166 | 16388 |
| 4. Unemployment rate | 5.6 | 5.6 | 6.4 | 7.4 | 6.0 | 6.1 | 5.6 | 6.1 | 5.0 | 4.0 | 5.4 | 6.8 |
| 5. Initial Claims Filed | 6888 | 5376 | 9704 | 10334 | 6508 | 4621 | 8659 | 9691 | 5673 | 4682 | 8791 | 9745 |
| 6. Miners' Average Weekly Hours | 43.6 | 43.4 | 42.7 | 46.3 | 34.8 | 45.2 | 45.2 | 43.9 | 33.9 | 46.2 | 46.5 | 46.4 |
| 7. Miners' Average Weekly Pay ($) | 533.42 | 619.70 | 627.33 | 678.68 | 651.62 | 656.60 | 661.19 | 648.65 | 684.52 | 685.37 | 703.83 | 732.44 |
| 8. Miners' Average Hourly Wage ($) | 12.23 | 14.29 | 14.68 | 14.67 | 18.73 | 14.54 | 14.63 | 14.77 | 20.19 | 14.83 | 15.14 | 15.78 |

[1]The most recent year's data are preliminary.

Sources: Series 1-11: Wyoming Employment Security Commission. Labor Force Trends. Published monthly.

Table 7: Energy and Mineral Production

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Wyoming Coal (TST) | 39016 | 42883 | 41013 | 41874 | 40928 | 45064 | 43879 | 45310 | 40541 | 47488 | 48131 | 45652 |
| 2. U.S. Coal (TST) | 225968 | 239046 | 227754 | 249267 | 226258 | 257202 | 248741 | 266235 | 249068 | 268296 | 251951 | 222799 |
| 3. Wyoming Oil (TBPD) | 317 | 306 | 299 | 302 | 299 | 291 | 291 | 286 | 289 | 284 | 284 | 282 |
| 4. U.S. Oil (TbPD) | 8216 | 8033 | 7984 | 7753 | 7701 | 7529 | 7463 | 7374 | 7275 | 7150 | 7346 | 7424 |
| 5. Wyoming Natural Gas (MMCFD)[1] | 1339 | 1135 | 1455 | 1953 | 1274 | 1340 | 1820 | 2009 | 1754 | 1226 | INA | INA |
| 6. U.S. Natural Gas (MMCFD) | 46453 | 44547 | 48982 | 51693 | 48980 | 47211 | 49795 | 52982 | 49343 | 47256 | 51385 | INA |
| 7. Active Rig Counts in Wyoming--Average | 33 | 43 | 31 | 20 | 22 | 43 | 50 | 34 | 31 | 44 | 39 | 28 |

[1]Beginning with fourth quarter 1986, Wyoming gas includes carbon dioxide production

Sources: Series 1,2,5 and 6: U.S. Department of Energy. Energy Data Reports. Gas data are from Natural Gas Monthly, and the Wyoming Oil and Gas Conversation Commission. Coal data are published weekly.
Series 3-4: The Oil and Gas Journal. U.S. and Wyoming Oil Production. Published weekly.
Series 7: Petroleum Information Corporation, Hughes Tool Company. Monthly Average Active Rig Counts in Wyoming.

Table 8: Government

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sales and Use Tax Collections (T$) | 42769 | 49721 | 46445 | 41823 | 42966 | 53145 | 54618 | 51699 | 50077 | 61746 | 61387 | 56536 |
| 2. Violent Crime[1] | 371 | 431 | 308 | 310 | 278 | 323 | 307 | 301 | 335 | 376 | 322 | NA |
| 3. Nonviolent Crime[2] | 4562 | 4662 | 3917 | 3565 | 4423 | 4704 | 4138 | 3800 | 4432 | 5000 | 4055 | NA |
| 4. Stolen Property (T$) | 1986 | 2467 | 2272 | 2040 | 2617 | 2200 | 1894 | 2151 | 2269 | 2297 | 2223 | NA |
| 5. Stolen Property Recovery Rate | 43.1 | 35.5 | 36.0 | 42.8 | 30.5 | 44.0 | 36.7 | 46.3 | 38.6 | 43.3 | 43.5 | NA |
| 6. Percent of Crimes Cleared[3] | 28.3 | 30.9 | 40.0 | 33.0 | 27.5 | 27.1 | 29.5 | 35.2 | 28.6 | 27.7 | 30.6 | NA |

[1]Murder, negligent homicide, forcible rape, robbery, aggravated assault.
[2]Burglary, larceny, auto theft.
[3]Clearance of a crime indicates resolution of a complaint by arrest or other extraordinary means.

Sources: Series 1: Wyoming Department of Revenue and Taxation, Sales and Use Tax Division. "Net Collections by Business Class by County."
Series 2-6: Uniform Crime Reporting Center for Criminal Justice Research, Division of Criminal Identification, Office of the State Attorney General. "Crime in Wyoming." Published quarterly.

Table 9: Tourism

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Visitors, National Parks and Monuments | | | | | | | | | | | | |
| 1. Yellowstone | 649842 | 1268270 | 216076 | 82542 | 720021 | 1724290 | 153523 | 79552 | 761664 | 1857973 | 139998 | 174149 |
| 2. Grand Teton | 624400 | 1083754 | 223562 | 211180 | 665734 | 1361210 | 302539 | 170799 | 680593 | 1544479 | 284906 | 193905 |
| 3. Devil's Tower | 109993 | 222877 | 20702 | 8064 | 120589 | 229668 | 19106 | 8251 | 119264 | 279985 | 20224 | 9983 |
| 4. Fossil Butte | 5894 | 13838 | 1195 | 224 | 5565 | 13192 | 1452 | 195 | 6692 | 25244 | 2945 | 888 |
| 5. Fort Laramie | 24384 | 49631 | 4145 | 1475 | 20488 | 40697 | 3007 | 1505 | 21869 | 41037 | 2845 | 1666 |
| 6. Big Horn NRA-South[1] | 60727 | 58820 | 35558 | 14293 | 47417 | 62160 | 185172 | 15664 | 102821 | 70249 | 29713 | 26608 |
| Other Tourism Indicators | | | | | | | | | | | | |
| 7. Traffic Count (Avg. Number of Vehicles/Day) | 142830 | 178675 | 118023 | 113409 | 146663 | 184209 | 118130 | 105793 | 159830 | 206100 | 125782 | 112278 |
| 8. Hotel, Motel, and Camp Sales Tax (TS) | 1050 | 2106 | 1929 | 954 | 1013 | 1962 | 1951 | 991 | 1135 | 2731 | 2082 | 1045 |
| 9. Gasoline Sales (TGL) | 81811 | 96106 | 70784 | 61807 | 78869 | INA | INA | INA | INA | INA | INA | INA |

[1]Big Horn Canyon N.R.A. is only partially in Wyoming. Only visitation for the Wyoming part is shown.

Sources: Series 1-6: Monthly visitor use reports of the National Park Service.
Series 7: Traffic Survey Unit-Planning Branch, Wyoming State Highway Department. "Selected Recording Stations Traffic Counter Data." Published monthly.
Series 8: Wyoming Department of Revenue and Taxation. "Sales and Use Tax Summary by County by SIC Major and Minor." Reported monthly.
Series 9: Petroleum Association of Wyoming. Monthly Gasoline Gallonage Report.

Table 10: Utilities[1]

| Calendar Quarters | 2/88 | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Residential Electric Connections | 176333 | 177122 | 176457 | 175841 | 175589 | 175485 | 176197 | 174439 | 179163 | 176520 | 176434 | 176345 |
| 2. Residential Electric Consumption (TKWH) | 351036 | 301098 | 401776 | 688891 | 348577 | 296588 | 418463 | 488454 | 351960 | 304197 | 440211 | 529119 |
| 3. Commercial Electric Connections | 33722 | 33846 | 33756 | 33928 | 33997 | 34038 | 140722 | 34036 | 34278 | 34370 | 34281 | 34353 |
| 4. Commercial Electric Consumption (TKWH) | 420630 | 425495 | 426766 | 467697 | 414902 | 428705 | 449339 | 457875 | 447084 | 469100 | 469265 | 498454 |
| 5. Industrial Electric Connections | 2748 | 2921 | 2872 | 2972 | 3104 | 3143 | 3084 | 3203 | 3507 | 3535 | 3431 | 2909 |
| 6. Industrial Electric Consumption (TKWH) | 1815370 | 1720051 | 1847617 | 1812799 | 1923513 | 1790624 | 1968557 | 1990072 | 1919833 | 1796303 | 2131555 | 1885977 |
| 7. Other Connections[2] | 3690 | 3899 | 3404 | 3349 | 7440 | 4573 | 4091 | 4675 | 4198 | 4280 | 3908 | 3790 |
| 8. Other Consumption (TKWH) | 24283 | 64994 | 13221 | 9051 | 41364 | 102572 | 59012 | 57146 | 57187 | 94327 | 59782 | 136109 |
| 9. Residential Natural Gas Connections | 73935 | 90673[3] | 93300 | 100074 | 99535 | 97665 | 90086 | 90456 | 90223 | 89853 | 90327 | 90234 |
| 10. Residential Natural Gas Consumption (MCF) | 2042533 | 826220[3] | 2521850 | 5786697 | 2436947 | 871763 | 2454142 | 4537105 | 2321660 | 760692 | 10731338 | 7052337 |
| 11. Commercial Natural Gas Connections | 6560 | 8357[3] | 9398 | 9422 | 9289 | 10514 | 18913 | 19028 | 18910 | 18928 | 18746 | 19588 |
| 12. Commercial Natural Gas Consumption (MCF) | 957241 | 475106[3] | 1349515 | 2981071 | 1283967 | 631348 | 1818451 | 3305106 | 1702262 | 614511 | 7950861 | 5410448 |
| 13. Industrial Natural Gas Connections | 90 | 90 | 78 | 85 | 82 | 80 | 79 | 73 | 73 | 71 | 68 | 63 |
| 14. Industrial Natural Gas Consumption (MCF) | 482088 | 2324709 | 2504087 | 3069267 | 1977830 | 2279086 | 2611580 | 3019329 | 2774710 | 1810840 | 3361610 | 3127187 |
| 15. Other Natural Gas Connections | 36 | 35 | 34 | 36 | 36 | 34 | 33 | 29 | 32 | 38 | 37 | 38 |
| 16. Other Natural Gas Consumption (MCF) | 1920 | 7488 | 232 | 1216 | 4344 | 10405 | 312 | 138 | 2309 | 1138300[4] | 1384771 | 608554 |

[1]Some small utilities do not report, hence the data are slightly less than actual state totals. The data are consistent. The same utilities' reports are included in each figure.
[2]"Other" includes agriculture, municipal, and other public.
[3]Starting with third quarter, 1988, the figures for Residential and Commercial Natural Gas connections and Residential and Commercial Natural Gas Consumption reflect the merger of Northern Gas Division, Northern Utilities division, and Northern Mountain Gas Company now doing business as Northern Gas of Wyoming.
[4]Starting with third quarter, 1990, Mountain Fuel Supply included gas transported by their company for another company in the "other" category.

## FORMAT

For data available at least quarterly, the last 12 quarters are printed in **WQU**. In this edition, published series begin with the 2nd quarter of 1988, and end with the 1st quarter of 1991. For other data series (primarily annual, the most recent observations, up to 12, are published in **WQU**. Quarters are calendar quarters. For example, the 4th quarter is composed of October, November and December. In the table headings and narratives, a particular quarter will be indicated by notation such as 4/87 (4th quarter, 1987), 1/88 (1st quarter, 1988), and so on.

Besides each data series name is an abbreviation in parenthesis. The abbreviation indicates the units (such as dollars, tons, feet, miles, etc.) of the data. The key to the units abbreviations is below.

Throughout **WQU**, all data are for the State unless otherwise stated. The most recent year's data should be viewed as preliminary, due to revisions. The acronym "INA" signifies that information is not available.

The reader should be attentive to the footnotes at the bottom of pages, particularly those accompanying a data table. The footnotes help the reader to properly interpret the data, and they also indicate when more detailed (by subject or by area) data than that which is shown is available from SRC. A list of sources follows the footnotes.

Key to Units Abbreviations

| | | | | | |
|---|---|---|---|---|---|
| MBF | - | Thousand Board feet | CWT | - | Hundred Weight |
| KWH | - | Kilowatt Hours | ST | - | Short Tons |
| TKWH | - | Thousand Kilowatt Hours | HST | - | Hundreds of Short Tons |
| $ | - | Dollars | TST | - | Thousands of Short Tons |
| H$ | - | Hundreds of Dollars | $/ST | - | Dollars per Short Ton |
| T$ | - | Thousands of Dollars | HBBL | - | Hundreds of Barrels |
| M$ | - | Millions of Dollars | TBPD | - | Thousand of Barrels per Day |
| B$ | - | Billions of Dollars | MCF | - | Thousand of Cubic Feet |
| GL | - | Gallons | HMCF | - | Hundreds of MCF Per Day |
| TGL | - | Thousands of Gallons | MMCFD | - | Million Cubic Feet Per Day |

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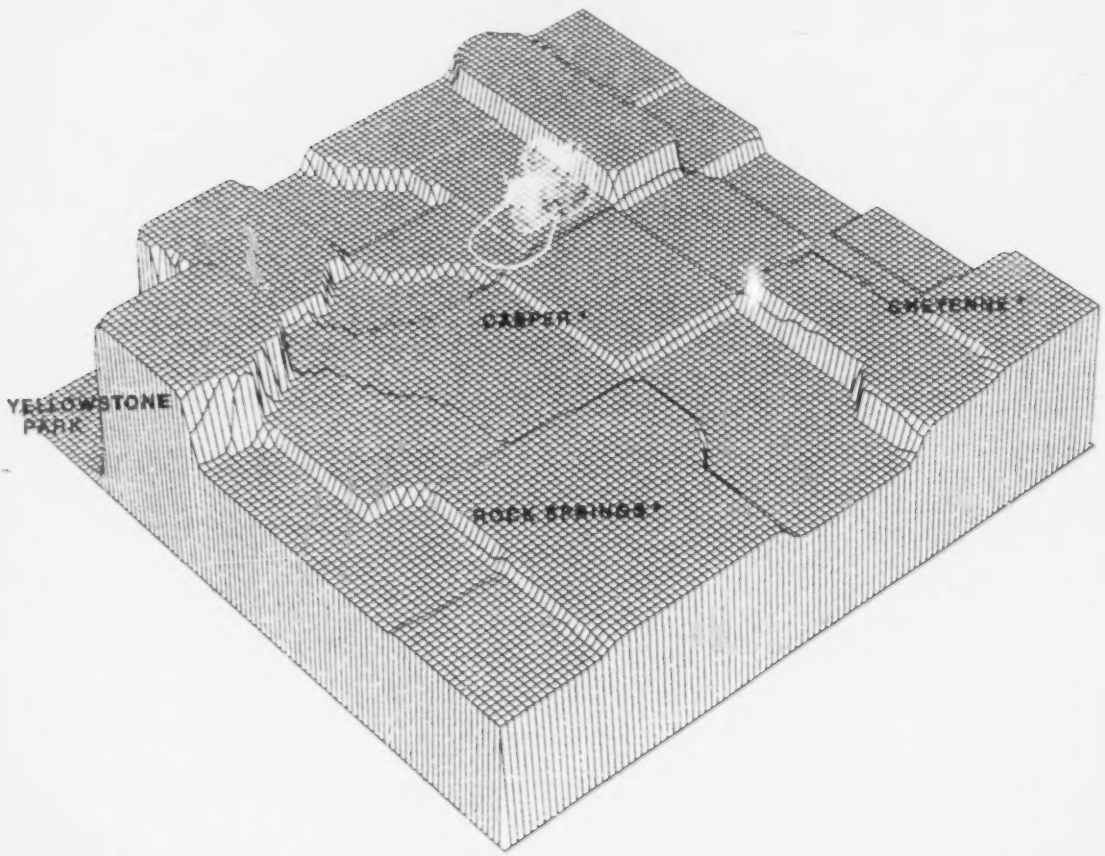
# WYOMING QUARTERLY UPDATE

Summer 1991

Vol. 10, No. 4

Median Rent (Dollars), 1990 Census

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## Wyoming Quarterly Update

Wyoming Quarterly Update (WQU) represents the efforts of the Survey Research Center at the University of Wyoming to provide improved data access services. The data presented in WQU are assembled from secondary sources, such as government agencies and private industry. The staff of SRC greatly appreciates the ongoing, helpful cooperation of each of the data sources.

WQU provides current indicators and timely, easily accessible data. Most of the data published in WQU are updated quarterly with the most current numbers. The complete data sets from which WQU originates are maintained, together with documentation by SRC. Readers are encouraged to contact the Center to find out how to gain access to data which do not appear in the WQU. Many data series, such as gasoline sales and taxation data, span more than 30 years. Numerous other series cover 20 years or more.

The cover of each edition features a contour map illustrating the geographic distribution of a particular variable. This edition presents data from the 1990 Census on the median rent for each county. The median rent for the state is $270.00. Six counties, Albany, Campbell, Laramie, Sublette, Sweetwater, and Teton, have median rents higher than the state. Only Teton county, with a median rent of $392.00, is above the U.S. median of $374.00.

| County | Median Rent | County | Median Rent | County | Median Rent |
|---|---|---|---|---|---|
| Albany | 296 | Hot Springs | 219 | Sheridan | 245 |
| Big Horn | 204 | Johnson | 242 | Sublette | 275 |
| Campbell | 299 | Laramie | 312 | Sweetwater | 279 |
| Carbon | 231 | Lincoln | 248 | Teton | 392 |
| Converse | 229 | Natrona | 252 | Uinta | 258 |
| Crook | 231 | Niobrara | 175 | Washakie | 236 |
| Fremont | 236 | Park | 266 | Weston | 217 |
| Goshen | 216 | Platte | 223 | Yellowstone | 0 |

First-time readers of WQU should refer to the "format" explanations at the end of the magazine for keys on how best to use and interpret data presented in this publication.

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***Wyoming Quarterly Update*** is published four times per year in fall, winter, spring, and summer editions.



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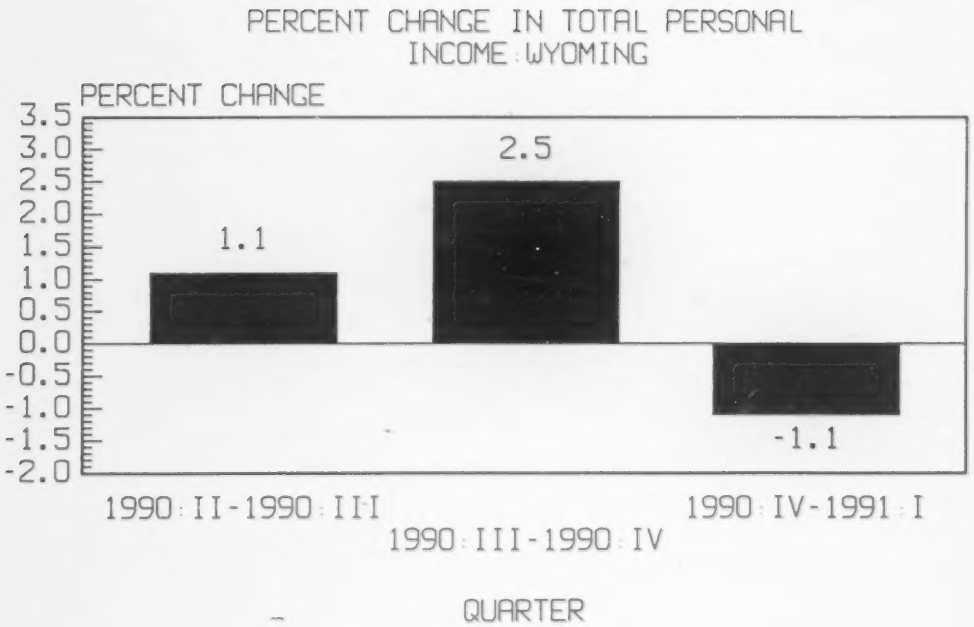
# Wyoming Scene




SOURCE BUREAU OF ECONOMIC ANALYSIS

# Overview and Perspectives

Business conditions looked fairly healthy in the 2nd quarter of 1991. Total bank loans and leases financing receivables, total bank deposits, and total non-interest bearing deposits were all up from the previous quarter, as well as the same quarter a year ago. Also, savings and loan mortgage loans were up from 1st quarter of 1991, the first increase since 4th quarter 1989.

The same trend is seen in the construction arena. New residential dwelling units, value of residential dwellings, value of non-residential construction, and the number of building permits issued in Wyoming cities were all up from 1st quarter 1991 and from a year ago as well.

The seasonally adjusted unemployment rate for the state rose during the second quarter from 5.2 percent in April to 5.4 percent in June, but remained well below the U.S. seasonally adjusted unemployment rates of 6.6 percent and 7.0 percent respectively. Uinta County had the highest unemployment rate all three months. While Albany County started off the quarter with the lowest unemployment rate in the State, Teton County took over those honors in May and June.

The Bureau of Economic Analysis reported a slowdown in personal income growth in the first quarter of 1991. Personal income declined in 14 states. Nationally, personal income increased only .3 percent in the first quarter of 1991, compared to a 1.0 percent increase in the fourth quarter of 1990. This .3 percent increase was the smallest quarterly increase of the past two decades. In Wyoming non-farm personal income declined by .2 percent from fourth quarter 1990 to first quarter 1991. The durables manufacturing, nondurables manufacturing, and private service type industries [private service type includes wholesale and retail trade, the finance-insurance-real estate group, transportation-public utilities, and services] declined 2.0 percent, 4.3 percent, and 1.5 percent respectively; while construction, mining and government increased by .3 percent, 1.4 percent and 1.2 percent respectively.

The table on the next page tracks changes in personal income from preceding quarters for the U.S. and BEA regions. For more information on personal income, examine the divider pages of this edition.

This quarter the Feature Articles portion of the *Update* profiles scientific and technological endeavors occurring at the University of Wyoming and around the state. While these articles are by no means all inclusive on work of this nature, it does provide an interesting look at the kinds of activities taking place around the state and how these activities affect residents of Wyoming.

It is reported that gas producers have already signed contracts to transport over 500 million cubic feet of Wyoming gas per day through the Kern River Pipeline (capacity is 700 mcf). Read the Minerals Update to find out more about the pipelines as well as other mining activity in Wyoming.

## Terry's Trivia

As an aside, the 1991 Statistical Abstract will soon be released by the U.S. Department of Commerce, Bureau of the Census. This manual contains all sorts of information on topics ranging from physicians per 100,000 population (Wyoming's rate was 134 in 1988 which ranked them 48th among the states), to average teacher's salaries (average dollar amount for teachers in Wyoming for 1989-90 was $28,188, ranking 28th in the U.S.).

Terry Haven
Editor
Survey Research Center
University of Wyoming

**Table I:** Personal Income, Percent change from Preceding Quarter

| | 1990:I | 1990:II | 1990:III | 1990:IV | 1991:I |
|---|---|---|---|---|---|
| United States | | | | | |
| Total | 2.4 | 1.4 | 1.3 | 1.0 | 0.3 |
| Nonfarm | 2.0 | 1.6 | 1.5 | 0.9 | 0.3 |
| New England | | | | | |
| Total | 1.1 | 1.2 | 1.0 | 0.0 | -0.6 |
| Nonfarm | 1.0 | 1.2 | 1.0 | 0.1 | -0.6 |
| Mideast | | | | | |
| Total | 1.8 | 1.5 | 1.3 | 0.7 | 0.2 |
| Nonfarm | 1.7 | 1.5 | 1.4 | 0.8 | 0.2 |
| Great Lakes | | | | | |
| Total | 1.9 | 1.6 | 1.1 | 1.1 | 0.3 |
| Nonfarm | 1.3 | 1.9 | 1.4 | 1.0 | 0.1 |
| Plains | | | | | |
| Total | 3.1 | 0.9 | 0.1 | 2.4 | -0.1 |
| Nonfarm | 1.2 | 1.9 | 1.3 | 1.1 | 0.4 |
| Southeast | | | | | |
| Total | 2.9 | 1.3 | 1.4 | 0.3 | 0.7 |
| Nonfarm | 2.5 | 1.5 | 1.5 | 0.5 | 0.6 |
| Southwest | | | | | |
| Total | 2.4 | 1.8 | 1.7 | 1.5 | 0.6 |
| Nonfarm | 1.9 | 1.9 | 2.0 | 1.3 | 0.8 |
| Rocky Mountain | | | | | |
| Total | 1.8 | 1.7 | 1.0 | 3.2 | -0.3 |
| Nonfarm | 2.0 | 1.7 | 1.7 | 1.8 | 1.0 |
| Wyoming Total | | | 1.1 | 2.5 | -1.1 |
| Wyoming Nonfarm | | | 1.2 | 1.8 | -0.2 |
| Far West | | | | | |
| Total | 3.4 | 1.2 | 1.6 | 1.4 | 0.3 |
| Nonfarm | 3.3 | 1.2 | 1.7 | 1.5 | 0.3 |

# Summer Minerals Update

By the end of June, the fate of the $250 million State loan to Kern River Pipeline was no longer in doubt. Governor Sullivan agreed with final recommendations of the Wyoming Natural Gas Pipeline Authority and decided not to make the loan. In the meantime, Kern River started work on the Wyoming portion of the pipeline and Amoco, Pacific Gas and Electric, Union Pacific Resources, and others moved forward with in-fill drilling projects as well as a few wildcat gas wells in anticipation of the new California markets that are opening up for Wyoming.

While there is considerable optimism that the market for Wyoming natural gas is going to substantially increase, there is concern about the weakened price of natural gas. By the end of the second quarter, the spot price at Opal had dipped to $1.00 and many producers were getting closer to 65 cents per thousand cubic feet (MCF). In 1990, the average price paid for an MCF of methane was approximately $1.59.

Our estimates of methane production are 777 billion cubic feet (BCF) for 1990 and 795 BCF for 1991.

Based on the oil prices for the first six months of 1991, our estimated 1991 oil price of $17.00 is not looking high. While first quarter oil prices started to recover in the second quarter, the recovery was short-lived and posted prices for Wyoming sweet crude never got up to $20. First purchase prices for Wyoming sweet have been under $17.00 a barrel and sour crude is often less than $14.00.

Perhaps the brightest spot at mid-year was the significant increase in coal production. Production is already far enough ahead of last year that we have revised our forecast upward to 19.2 million tons for 1991. In addition, the COAL UPDATE describes 26 new contracts or test shipments of Wyoming coal.

In regard to other minerals, the bentonite industry has shown some modest gains as new uses for bentonite expand its market. One of the growth areas for bentonite is in the control of pollution. Trona is holding strong, but may not show any significant growth this year. Other mineral commodities showing strength in the second quarter were limestone for the production of lime, granite as railroad ballast, and decorative stone.

And a summary of the second quarter would not be complete without mentioning claim staking in the Hartville uplift. Earlier this year, several companies rushed to stake claims for zinc, silver, and gold mineralization in that area of eastern Wyoming.

Gary B. Glass
State Geologist
Geological Survey of Wyoming

## OIL AND GAS UPDATE

In late May, Governor Sullivan, on the advice of the Wyoming Natural Gas Pipeline Authority, decided not to make a $250 million low-interest State loan to Kern River Pipeline. The loan ultimately failed when Kern River rejected some of the State's terms.

The loan negotiations and the efforts of the Wyoming Natural Gas Pipeline Authority, however, focused national attention on Wyoming's very large gas resources and on the competitive price of Wyoming gas. Consequently, gas producers have already signed contracts to transport over 500 million cubic feet of Wyoming gas per day through the Kern River Pipeline. The capacity of the pipeline is 700 million cubic feet of gas per day.

In late June, work began on the 67 miles of the Kern River pipeline that is in Wyoming. Crews began surveying the route, began hauling pipe to storage sites in Uinta County, and began building a compressor station in Lincoln County. Kern River will have an office in Evanston after the pipeline is completed and will employ six to 12 permanent workers there. The pipeline is scheduled for completion by the end of 1991.

Another pipeline was proposed this quarter as a joint project by KN Energy and Tom Brown Inc. This pipeline will enable several natural gas producers in the Wind River Basin to market their gas through KN Energy's interstate pipeline system. The 80-mile-long pipeline would initially gather up to 30 million cubic feet of gas per day from Fuller Reservoir, Pavillion, Muddy Ridge, and Poison Creek Fields.

In other pipeline news, the U.S. Bureau of Land Management issued Exxon a right-of-way for a pipeline that will transport carbon dioxide from Bairoil to Hartzog Draw Field in the Powder River Basin. The 155-mile pipeline initially will carry 50 million cubic feet per day of carbon dioxide for use in an enhanced oil recovery project at Hartzog Draw Field.

Amoco and Pacific Gas and Electric each announced plans to drill additional natural gas wells in southwestern Wyoming. Amoco plans to drill 72 new wells in Sweetwater and Lincoln Counties while Pacific Gas and Electric plans to drill 59 new natural gas wells in Lincoln County. Both companies have received Federal approvals. FMC Corp., which is a partner in the Pacific Gas and Electric wells, may use some of the gas at their trona mine in the Green River Basin. The new gas from the Pacific Gas and Electric project will be eligible for a tight gas sands tax credit. Natural gas that is produced from these two projects will supply part of the increased demand for Wyoming natural gas when the Kern River Pipeline and the Northwest Pipeline expansion are completed.

Union Pacific Resources Co. also has plans to increase exploration and development drilling in southwestern Wyoming. The company budgeted $46 million for nine wildcat wells and 50 development wells for the remainder of this year. These wells, along with the wells planned by Amoco and Pacific Gas and Electric, should increase Wyoming's daily rig count, which has oscillated around 30 for the first six months of 1991.

The Federal Energy Regulatory Commission (FERC) is reviewing a recommendation made by the Wyoming Oil and Gas Conservation Commission to designate the Blair, Baxter, and Frontier as tight gas formations in portions of southwestern Wyoming. FERC is considering a tight gas designation for the Frontier in parts of T26N, R112-113W; T27N, R112W; and T28N, R113W; for the Baxter in parts of T26N, R112-113W; T27N, R112-113W; T28N, R112-113W; and T29N, R113W; and for the Frontier and Blair in identical areas in parts of T18N, R97-98W; and T19N, R97-98W. If FERC approves these recommendations, gas production from the tight formations in these areas will be eligible for a tax credit.

Lease sales in the State did fairly well during the second quarter of this year although total revenue has dropped off somewhat compared to sales held during the fourth quarter of 1990 and the first quarter of 1991. The U.S. Bureau of Land Management's (BLMS's) April sale had a high per-acre bid of $170 by Plains Petroleum Operating for a 640-acre tract that covers section 12, T12N, R94W. The parcel is just east of State Line Field.

The high per-acre bid at the BLM's June sale was $275 made by Samedan Oil Corp. for a 940.7-acre parcel that includes parts of sections 17, 29,32, and 34, T37N, R75W. The tract is near the north end of Sand Dunes Field. Maurice W. Brown bid $235 per acre for a 154.68-acre tract that includes lots 5,6,7, and 9 of section 7, T53N, R68W, in Prairie Creek Field.

The high per-acre bid at the State Land and Farm Loan Office's May sale was only $77.

Four G Oil Co. made the high bid for a 76.33-acre tract that covers the N/2 NW section 31, T55N, R67W. The tract is a mile southeast of Minnelusa oil production at Carr Creek Field and a mile northwest of Minnelusa oil production at Little Missouri Field.

**Exploration and Development**

Company data and information compiled and published by Petroleum Information indicate the following significant exploration and development events occurred in Wyoming during the second quarter of 1991. Activities related to horizontal drilling and coalbed methane are discussed in separate sections.

A. Exxon Corp. moved in rigs to drill two 15,000-foot Bighorn Dolomite tests in the Overthrust Belt. The 1 Boxer Jack Unit well is currently drilling in NW SE section 4, T21N, R118W and the 2 Collett Creek Unit well is drilling in NE NW section 30, T21N, R118W. Both wells are in the vicinity of Exxon's Collett Creek Field. Collett Creek Field had produced over 77,000 barrels of oil and nearly 321 million cubic feet of gas through March of 1991. The one-well field produces from the Bighorn and the well has produced for only one year. These two new wells bring the number of active rigs in the Wyoming portion of the Overthrust Belt to three, the highest rig activity in that region for some time.

B. Amoco Production completed two Dakota wells in Bruff Field. The 15 Seven Mile Gulch well in SE NE section 21, T20N, R112W flowed 12.7 million cubic feet of gas, 120 barrels of condensate, and 30 barrels of water per day. The 1 Champlin 122A well in SE NE section 29, T20N, R112W flowed 17.1 million cubic feet of gas and 26 barrels of condensate per day. Just to the south in Bruff Field, Texaco Inc. completed the 2 Government-Donley NCT-2 well in SW SE section 2, T18N, R112W. The Texaco well flowed 4.6 million cubic feet of gas per day from the Frontier.

C. Presidio Oil Co. completed a wildcat well, the 1-112 Amoco-UPRR, in W/2 NW section 11, T22N, R96W. The well flowed 1.2 million cubic feet of gas and 50 barrels of condensate per day from the Lewis Shale. Presidio may drill up to four additional wells to delineate the productive area and has already staked a location to evaluate the Lance, Lewis, and Almond one mile southeast of the discovery.

D. Wold Oil Properties discovered gas in the Lance with their 2-27 Crooks Creek-Federal well in NW SW section 27, T27N, R92W. The new discovery flowed 887,000 cubic feet of gas per day from an acidized and a nitrogen-fractured, 20-foot zone. The nearest Lance production is nearly 30 miles southwest at Hay Reservoir Field.

E. Pacific Enterprises Oil Co. recovered oil on a drillstem test of the Phosphoria at their 12-29 Dishpan-Federal well in SW NW section 29, T31N, R95W. The one-hour test recovered 160 feet of mud-cut-oil and 240 feet of water while the sample chamber held 860 cubic centimeters of oil and 1,290 cubic centimeters of water.

F. Amerada Hess completed an offset to their discovery well at Saddle Rock Field. The new well, the 27-21 Saddle Rock Unit, had a bottom-hole location in NE NW section 27, T33N, R86W, and pumped 452 barrels of oil and 759,000 cubic feet of gas per day from the Muddy. The discovery well, which was completed in NW NE section 27, T33N, R86W, flowed 67 barrels of oil and 289,000 cubic feet of gas per day from the Muddy.

G. The 2 Moneta Hills Unit well in SW SW section 30, T38N, R89W, flowed 157,000 cubic feet of gas and 34 barrels of condensate per day from the Fort Union Formation. This is the second Fort Union producer in Moneta Hills Field that has been completed by Wagner & Brown within the last year.

H. Maxus Exploration completed a new Minnelusa well in Alpha Field. Their 1 Alpha Unit well in SW SW section 1, T51N, R69W, pumped 653 barrels of oil and three barrels of water per day. Alpha Field has produced over

two million barrels of oil since its discovery in 1987.

I. Yates Petroleum discovered Minnelusa oil at their offset to the discovery well at Elvira Field. The new well, the 1 East Elvira, in NE NE section 22, T51N, R70W, pumped 120 barrels of oil per day.

J. Pacific Enterprises Oil discovered oil in the Minnelusa at their 24-30 Tanner-Federal wildcat well in SE SW section 30, T51N, R70W. The well pumped 580 barrels of oil per day. The new discovery is about a mile west of Minnelusa oil production at Dutch Field.

K. Flying J Exploration & Production completed two new offset wells to a discovery well that was completed earlier this year. The 9-25 Thompson well in NW SE section 25, T51N, R69W, offsets the discovery well to the east. It pumped 613 barrels of oil per day from the Minnelusa. The 15-25 Thompson well in SW SE Section 25, T51N, R69W, pumped 281 barrels of oil per day from the Minnelusa and offsets the discovery well to the south.

L. L & W Group completed a Fall River discovery, the 1 Federal well, in SW NW section 32, T49N, R66W. The new discovery pumped five barrels of oil and 17,000 cubic feet of gas per day.

M. Nicor Oil & Gas completed the fourth producer in Mallard Field. The 22-34 Merganser-Federal well in SE NW section 34, T49N, R72W, pumped 540 barrels of oil per day from the Minnelusa. The field has produced over 139,000 barrels of oil since the discovery well was completed in July, 1990.

N. W.A. Moncrief Jr. completed the second well in Popskull Field. The new well, the 28-2 Popskull, is in NW NE section 28, T35N, R75W. This well pumped 35 barrels of oil and 2,000 cubic feet of gas per day from the Muddy. In about two years of production, the discovery well has produced nearly 41,000 barrels of oil and 18.6 million cubic feet of gas from the Muddy.

**Horizontal Drilling**

During the second quarter of 1991, the following significant activities related to horizontal drilling occurred. The discussions are based on company data and on information compiled and published by Petroleum Information.

A. Horizontal drilling in the Niobrara continues in and around Silo Field. Exxon tested their 1H Blevins Oil Unit well drilled from a surface location in SE SW section 6, T15N, R64W. The well flowed at a rate of 1,008 barrels of oil and 501,000 cubic feet of gas per day. Exxon also produced nearly 11,000 barrels of oil from the well during drilling. Gerrity Oil and Gas tested their 4-9H State well, which was drilled from a surface location in NE SE section 4, T15N, R64W. Oil flowed at a calculated rate of 2,026 barrels per day during a 12-hour test. Union Pacific's 2H Leroy Goertz 14-3 well, which was drilled from a surface location in SW SW section 3, T15N, R64W, produced an average of 204 barrels of oil and 72,000 cubic feet of gas per day during 22 days of production in March, 1991. Snyder Oil staked a location for a horizontal Niobrara test at a surface location in SW SW Section 19, T16N, R64W. Test results of Snyder's 10-21 Hutton well in SW NW section 21, T16N, R64W, are still unavailable. Silverado Oil staked a location for a horizontal Niobrara test at a surface location in SE SE Section 18, T16N, R64W. Silverado plans to reenter the 1-18-16-H State Well and to begin building the angle at 7,635 feet for a horizontal test.

B. Meridian Oil plans to drill a horizontal Niobrara test at a surface location in SE SW Section 29, T14N, R68W. The location is about 23 miles west of Silo Field and is the company's first wildcat in the horizontal Niobrara play.

C. Union Pacific Resources completed their 1 H Helbaum 11-11 well as a dry hole. The well was about 12 miles south of Chugsprings Field, an abandoned Niobrara and Codell producer.

D. Amoco still has not started their horizontal well to test the Niobrara and Frontier in NE SW section 25, T33N, R72W.

E. Harvey E. Yates Co. still has not released any test results on their horizontal Niobrara test in SE NW section 19, T44N, R71W.

F. GLG Energy still has not released details on their horizontal Niobrara test in SW NE section 6, T38N, R77W and no activity has occurred at their location in NW NE section 3, T39N, R78W.

**Coalbed Methane**

During the second quarter of 1991, the following significant activities related to coalbed methane occurred. The discussions are based on company data and on information compiled and published by Petroleum Information.

A. DeKalb Energy abandoned their location for a test of coal beds in the Upper Cretaceous Adaville Formation. The location was in SE NW section 36, T22N, R117W.

B. Barker and others (1991) of the U.S. Geological Survey reported a total coalbed methane content of 100 cubic feet per ton from coal beds cored in the Mesaverde Formation from depths of 470 to 590 feet at a well in SE section 32, T2S, R2E. In the area of the well, the aggregate thickness of coal beds is up to 30 feet. Fifteen miles to the east, the aggregate thickness of coal beds is reportedly around 100 feet at about 3,500 feet depth. Barker and others (1991) believe the coalbed methane potential in more deeply buried coals in this area should be good.

C. Cockrell Oil staked a location for a coalbed methane test in the Fort Union Formation in NW NW section 15, T24N, R98W. The test is projected to 5,400 feet in the Lance Formation.

D. Triton Oil and Gas Corp. is still awaiting a decision by the BLM before they can continue with development of methane from Mesaverde coals.

E. No details are available on Buttonwood Petroleum's two Mesaverde coalbed methane wells in sections 19 and 21, T22N, R104W. Both wells were drilled in 1990, but there has been no report of any production from either well.

F. Buttonwood Petroleum ran production casing at their 9-5 UPRC well in C SE section 9, T20N, R105W. The well was drilled to test the coalbed methane potential of Mesaverde coals. Buttonwood has another location staked in the SE SW of the same section.

G. Fuel Resources Development is now producing methane and water from 10 wells in the Wyoming portion of Dixon Field. All of the wells are in sections 1, 2, 11, and 12, T12N, R90W. The wells are producing from Almond Formation coal beds. The company plans to drill additional wells in the area.

H. Conquest Oil's coalbed methane test in the Ferris Formation in section 23, T23N, R83W, was completed as a dry hole and their location in section 30, T24N, R83W, was abandoned.

I. Also in the Hanna Basin, Metfuel is still dewatering their two Hanna Formation coalbed methane wells in sections 3 and 11, T23N, R81W. Metfuel has locations staked for nine additional coalbed methane tests in T23N, R81W.

J. Betop Inc. and Martens and Peck Operating are producing coalbed methane from 10 Fort Union wells in Rawhide Butte Field. A well operated by National Coop Refining and a well operated by Martens and Peck are currently shut-in. Rawhide Butte has produced nearly 500 million cubic feet of gas since it was discovered in 1989.

**Huff 'n' Puff Carbon Dioxide Projects**

During the 7th Wyoming Enhanced Oil Recovery Symposium in Casper, Wyoming, on May 1-2, 1991, Harry Deans of the University of Wyoming and Robin Passmore of Amoco Production reported the results of a number of carbon dioxide stimulation (huff' n' puff) projects in Wyoming. The discussions are summaries of the results that were reported at the Symposium in Casper.

A. Wold Oil in cooperation with the Enhanced Oil Recovery Institute (EORI) injected the Dakota twice at the Crooks Gap #4 well in Crooks Gap Field. The first cycle of injection produced 3,800 barrels of oil and the second cycle produced an estimated 6,000 barrels of oil so far. The production has stabilized at 22 barrels of oil per day.

B. Amoco cooperated with EORI on a one-well test of the 2nd Cody sand in the Cody #37 well at Beaver Creek Field. The incremental oil that was produced in this well was less than 100 barrels.

C. Marathon cooperated with EORI on a one-well test of the Frontier Formation in the Washakie 11-33 well at Grass Creek Field. There was less than 100 barrels of incremental oil produced in this well.

D. Timberline Production Company cooperated with EORI on a one-well test of the Muddy Sandstone in the Morningstar 1-36 well in Grieve North Field. The well has produced less than 200 barrels of incremental oil.

E. G. G. Nicolaysen cooperated with EORI on a one-well test of the Dakota in the Cole Creek #42X-26G well in Cole Creek Field. There were problems with the pumping system, but the well has produced 1,500 barrels of oil since the stimulation and oil cut has improved substantially.

F. Amoco injected seven wells at Lost Soldier and Wertz Fields. Three tests were in the Darwin Sandstone and Madison Limestone interval, three tests were in the Flathead Sandstone, and one test was in the Tensleep Sandstone. Four of the tests were considered economic, two would have been economic if mechanical failures had not occurred, and one had questionable data because of operating problems. Production of incremental oil at six of the test wells ranged from 925 to 6,600 barrels and totaled 20,635 barrels.

G. Amoco injected three wells in Salt Creek Field. Two tests were in the 2nd Wall Creek Sandstone and one test was in the 1st Wall Creek Sandstone. One of the 2nd Wall Creek Sandstone tests had produced 4,500 barrels of incremental oil through mid-April. The other two tests mobilized tertiary oil, but the volume was impossible to determine because of severe leakoff of carbon dioxide to other wells. Amoco plans four more tests in Salt Creek Field during 1991.

Reference Cited

Barker, C.E., Johnson, R.C., Pawlewicz, M.J., Crysdale, B.L., and Clark, A.C., 1991, Coal-bed methane show within the Wind River Indian Reservation enhances gas prospects in deeper portions of the Wind River Basin, Wyoming (abs.): American Association of Petroleum Geologists Bulletin, v. 75, no. 6, p. 1122-1123.

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## COAL UPDATE

Wyoming coal production for the first half of 1991 appears to be well ahead of last year's record pace. Based on coal delivery reports from electric utility companies in the first quarter of 1991, about 3.8 million tons more coal were produced during the first three months of this year than for the same period last year. If this trend continues the rest of the year and if unreported tonnage is the same as in 1990, total coal production for 1991 could be 9-10 million tons or about 5 percent greater than

last year. Supporting evidence for record production in 1991, mid-year figures from the Energy Information Administration (1991a), based on railcar loadings, indicate that production through June 15, 1991, was about 93.5 million short tons, an increase of about 9.6 million short tons from the 83.9 million tons reported for the same period in 1990. We have increased our earlier projection of 187.6 million tons of production in 1991 to 193.2 million tons.

Recently available data on the distribution and utilization of coal produced in 1990 (Energy Information Administration, 1991b) indicates that Wyoming coal was used in 30 different states and five other nations. Texas continued as the largest consumer of Wyoming coal in 1990, followed by Wyoming, Kansas, Oklahoma, Iowa, and Indiana. Four states consumed more than half of Wyoming's coal; nine states consumed almost 80 percent of Wyoming's coal.

In 1990, electric utility companies located in 22 different states and five other countries used 97.4 percent of Wyoming's total coal production to fuel steam-electric generating plants (Energy Information Administration, 1991b). Almost 0.7 million tons of the coal was exported to electric utility companies in Mexico, Canada, Spain, Japan, and Taiwan. Seventeen different states used Wyoming coal to fuel industrial boilers and seven different states used Wyoming coal for residential and commercial heating. About 1.7 million tons of the 4.8 million tons used in the "industrial" and "residential/commercial" categories went to Wyoming coal users, mostly other mineral-related industries. Four of the five trona plants in southwestern Wyoming used coal to generate steam for use in their refining process and in some cases, to produce electricity (cogeneration); many of the State's bentonite plants used coal in their refining process; and Mountain Cement Company used coal in their Laramie plant. Additional coal was used in FMC Wyoming Corporation's synthetic coke plant in Lincoln County and in a sugar beet processing plant at Torrington.

As in 1989, about 86 percent of Wyoming's coal was shipped out of the State in 1990, including the 0.7 million tons that were exported out of the country. Ironically, 164,500 tons of coal used in Wyoming was imported from Colorado, Illinois, Montana, Pennsylvania, Texas, and Utah. Most of this coal was used for industrial purposes. In many cases, this imported coal is used in Wyoming because it is the closest coal available for the lowest price. In other cases, the imported coal may have specific properties or characteristics not presently available in Wyoming.

According to the Energy Information Administration (1991b) and the Wyoming Department of Transportation, transportation of Wyoming coal in 1990 was primarily by railroads (87 percent); coal transported by barge on rivers and lakes refers to coal that reached its final destination by barge after originating on a railroad. The 168.7 million tons transported by rail in 1990 is 10.4 million tons (6.6 percent) greater than the 158.3 million tons transported in 1989. Truck transportation of Wyoming coal in 1990 was 5.1 million tons less than that in 1989 while transportation by tram/conveyer was 5.9 million tons more in 1990 than in 1989.

Burlington Northern Railroad (BN) dominates railroad haulage of Wyoming coal; the company's 108 million tons of coal accounted for about 64 percent of all coal shipped by rail. The amount of coal transported by BN in 1990 was five percent greater (5.5 million tons) than in 1989. Coal shipments on BN are from coal mines in the Powder River Coal Field and exit the field (and the State) to the east, south, and north.

Western Railroad Properties, Inc. (WRPI), which reports tonnages carried by the Chicago and North Western Transportation Company [a C&NW/Union Pacific Railroad Company (UP) joint-venture railroad out of the Powder River Coal Field], carried 5.3 million tons (or 12 percent) more coal in 1990 than in 1989. The 48.2 million tons of coal reported by WRPI accounted for 29 percent of the railroad tonnage in Wyoming.

Southern Wyoming coal fields are served by UP. The 9.8 million tons of coal hauled by UP in 1990 was 0.5 million tons less than that hauled in 1989. UP accounted for about six percent of the railroad tonnage in Wyoming.

Pacific Power and Light Company's (PP&L's) private railroad line between Glenrock Coal Company's mine and the Dave Johnston power plant hauled 2.7 million tons of coal in 1990.

The increased tonnages of coal hauled out of the Powder River Coal Field each year since 1983 have almost been matched by a corresponding increase in the amount of coal transported by the C&NW/UP joint venture, although in recent years BN tonnages have increased at a slightly greater rate than C&NW/UP tonnages. In contrast, coal tonnages hauled from southern Wyoming mines have decreased slightly each year since 1983 and reflect a plateau in coal production from southern Wyoming coal fields.

Of the 182.5 million tons of freight that originated on Wyoming railroads in 1990, about 92 percent of the freight was coal. Over 1.6 million railroad cars were used to haul this coal. Based on the 159 million tons of coal shipped out of Wyoming in 1990 and assuming that the average number of 100-ton coal cars in a coal unit train is about 105, there were approximately 15,143 unit trains of coal that left Wyoming last year. This amounts to about 41 full unit trains leaving the State every day and an equal number of empty unit trains returning.

In other coal developments in the second quarter of 1991, it now appears that some states with a large coal-producing industry are enacting legislation designed to control how the electric power-generating companies in those states will meet the Clean Air Act Amendments of 1990. At issue here are the coal-fired power plants that will be required to reduce stack emissions by January 1, 1995, under Phase I of the Act. Because many of the power plants "targeted" for emission reduction may opt to purchase low-sulfur western coal instead of installing flue gas "scrubbers" and continuing to burn higher sulfur eastern coals, the legislatures in states such as Ohio, Illinois, Indiana, and Kentucky are preparing bills to protect their state's coal industry. Some states are proposing incentives for utility companies to continue burning eastern coal such as the state paying the costs of scrubbers or coal transportation; tax credits, reduction or other relief from state taxes; or state purchase and ownership of rail cars. In some instances, proposed legislation would mandate the use of scrubbers at specific plants or units; in other cases, a utility company would have to calculate the socioeconomic impacts before switching to out-of-state coal. Most of the eastern coal-producing states are encouraging all the utility companies that burn fossil fuels to submit (and eventually have approved) detailed plans on how the utility is going to comply with the requirements of the Act. In nearly all cases, the proposed legislation would enable utility companies to ultimately pass on the costs of compliance to the consumers.

**Developments in western and southwestern Wyoming**

The compliance problems at Pacificorp's Naughton power plant near Kemmerer, which has led to a dispute over a coal supply contract, continued during the second quarter. The last of three mediators for the dispute was named at the end of May by the U.S. District Court in Cheyenne. The article in the last *Quarterly Update* erroneously reported that there are no flue gas scrubbers at the Naughton plant. Only Naughton Units 1 and 2 are unscrubbed; Naughton Unit 3 is already equipped with a wet scrubber.

Utah Power and Light Company (UP&L), the subsidiary of Pacificorp that operates the Naughton plant, is not only seeking to get the power plant back into compliance, but it is also seeking to either rewrite the current coal supply contract with Pittsburg and Midway Coal Mining Company's (P&M) Kemmerer mine or to eventually terminate the contract. UP&L is also seeking compensation from P&M for coal that was sold to other parties from the

mine. UP&L claims that coal from the mine is dedicated entirely to the Naughton power plant.

Industry sources indicate that UP&L recently tested coal from the Powder River Coal Field at the Naughton plant. As a related item, Pacificorp is now using coal from sources other than their company-operated coal mines at many of their power plants.

**Developments in the Hanna Coal Field**

In the second quarter, no new coal contracts or coal sales were reported. Arch of Wyoming's Medicine Bow mine will provide additional coal to Holly Sugar Company's Torrington sugar beet processing plant for next season's campaign (September, 1991 through February, 1992), but that is through an existing contract. An anticipated bid solicitation for additional spot coal for the Torrington plant did not materialize.

Coal from the Hanna Coal Field has been mentioned as a possible candidate for Tampa Electric company's coal-testing program this fall at the utility's Big Bend plant near Tampa, Florida. The testing program is part of Tampa Electric's efforts to determine how to comply with the 1990 Clean Air Act Amendments.

**Developments in the Powder River Coal Field**

The Whitney Benefits, Inc. lawsuit over unminable coal in an alluvial valley, which could award the corporation $140 million, appears closer to final settlement. The Federal government's request for a rehearing of the case before either a three-judge appeals court panel or the full 12-judge panel was rejected by the U.S. Court of appeals in May. The last chance the U.S. Government has to appeal the case is before the U.S. Supreme Court on July 1, 1991, or possible 30 days from that date.

There are apparently no longer plans for construction of a $50 million polyurethane plant and cogeneration unit north of Sheridan. A joint venture of Perkins Power Company of Sheridan and Petro Oil and Gas, Inc. of California, the plant would have converted the old Acme coal-fired power plant to a 12-megawatt cogeneration unit that combined coal gasification and plastics production. Evidently Perkins Power Company, the owners of the Acme plant, sold its ownership in the plant to American Plastics and Chemicals Company (APAC) of California. APAC announced that they would spend $5 million to refurbish and renovate the plant this summer. Eventually the coal-fired plant would go back on line as a small electrical generating unit. There is no indication who would supply coal to the plant.

**Coal contracts - Powder River Coal Field**

Coal purchasing activities during the second quarter of 1991 were numerous, as many spot sales and short term contracts were announced. As in the previous quarter, most of the coal purchased in the second quarter was on the spot market. A large number of coal sales during the second quarter were for either test burns or for blending.

New coal contracts and sales are summarized below:

A. Mobil Coal Producing, Inc.'s Caballo Rojo mine is supplying 850,000 tons of coal to Portland General Electric company's Boardman, Oregon, power plant. Deliveries began in May, 1991, and will continue through December, 1991. Transportation will originate on the Burlington Northern (BN) and terminate on the Union Pacific (UP) railroad.

B. Antelope Coal Company (a subsidiary of Nerco Coal Company) will supply 1.2 million tons of coal from their Antelope coal mine in northern Converse County to Kansas Power and Light Company's Jeffrey, Kansas, energy center. Deliveries began in April and will continue until the end of 1991. An additional 0.7 million tons of coal is optional under the sales agreement. The coal will originate on the Chicago North Western Transportation Company (C&NW)/Union Pacific

Railroad Company (UP) joint-venture rail line and will terminate on UP lines.

C. Amax Coal Company's Belle Ayr mine supplied an additional 20,000 tons of coal in 1990 and 1991 under an existing five-year, 125,000 ton-per-year contract with Fremont, Nebraska, Department of Utilities. The contract, which began in June, 1990, set the base price of the coal at $4.05/ton F.O.B. the mine. The additional 20,000 tons of coal were purchased throughout the first year of the contract and replaced possible solicitations for additional spot coal.

D. Mobil Coal Producing, Inc.'s Caballo Rojo mine will supply a total of 200,000 tons of spot coal to Dairyland Electric Power Cooperative's Genoa and Alma, Wisconsin, power plants. The tonnage will be split evenly between the two plants and will be delivered by railroad and by barge on the Mississippi River through the rest of 1991.

E. Carter Mining Company, a subsidiary of Exxon Coal USA, Inc., will supply from 250,000 to 1 million tons of spot coal from the Rawhide mine to Iowa-Illinois Gas and Electric Company's Louisa, Iowa, generating station. The coal will originate on the BN and terminate on the Soo Line with deliveries slated through the end of 1991.

F. Cordero Mining Company, a subsidiary of Sun Coal Company, will supply Iowa Southern Utility Company's Ottumwa, Iowa, power station with 0.6 million tons of coal from the Cordero mine. Deliveries via the BN began in May, 1991, and will continue until the end of this year.

G. Triton Coal Company, a division of Shell Mining Company, will supply Iowa Southern Utility Company's Burlington, Iowa, power plant with 200,000 tons of spot coal from the Buckskin mine. The coal will be delivered by the BN starting in May, 1991, and continuing through December, 1991.

H. An undisclosed amount of spot coal, probably from Mobil Coal Producing, Inc.'s Caballo Rojo mine and either Thunder Basin Coal Company's Coal Creek or Black Thunder mines, is being supplied to Electric Energy Inc.'s Joppa, Illinois, power plant. This coal may only be used in test burns, but is could also be supplemental to high-sulfur Illinois Basin coal currently burned at Joppa.

I. Mobil Coal Producing, Inc.'s Caballo Rojo mine supplies 70,000 tons of spot coal to Northern Indiana Power Company's (NIPSCO's) Dean H. Mitchell power plant in Indiana during June and July, 1991, under an "as-needed, as-available" purchase agreement.

J. Amax Coal Company's Belle Ayr mine also supplied 20,000 tons of spot coal to NIPSCO's Dean H. Mitchell plant in June, 1991, under a similar "as-needed, as-available" purchase agreement.

Coal purchased for test burns is summarized below:

K. Coal from Antelope Coal Company's Antelope mine was tested in April at Southwestern Public Service company's Harrington No. 1 unit in Texas.

L. Cordero Mining Company's Cordero mine supplied 40,000 to 50,000 tons of coal for test burns in May at Texas Utilities Generating Company's Monticello, Texas, power plant. Some of the coal was burned alone and some was blended with lignite during the tests. The utility company is planning to solicit bids on a 16.5-million-ton, 10-year contract for coal to supplement the lignite it normally burns at the plant. The coal from Cordero originated on the BN, was transferred to the Kansas City Southern at Kansas City, and delivered via the Louisiana and Arkansas Railroad.

M. The cordero mine also supplied test coal to Northern States Power Company's (NSP's) Sherco Units 1 and 2, Riverside Unit 8, and the High Bridge plant in Minnesota. So far, NSP has tested about 150,000 tons of coal from

a 200,000-ton spot coal contract with Cordero. The coal from Cordero will be tested with other Wyoming and Montana coals as well as burned alone.

N. About 8,000 tons of coal from an unidentified mine in the Powder River Coal Field was blended with 2,000 tons of higher quality coal at Rochester, Minnesota's Public Utility Department and tested in June. Another 10,000 tons of the blended product was probably tested in late June.

O. Rochelle Coal Company, a subsidiary of Peabody Holding Company, will supply test coal from the Rochelle mine in southern Campbell County to Wisconsin Power and Light Company's (WPL's) Columbia Unit No. 2 plant in Wisconsin. The coal will be blended with higher quality coal and tested this fall.

P. Rochelle Coal Company's Rochelle mine will also supply test coal to WPL's Nelson Dewey, Wisconsin, plant. The coal will be transported by rail to a transfer terminal on the Mississippi River at East Dubuque, Iowa, and then loaded onto a barge for final delivery to the Dewey plant.

Q. Antelope Coal Company will supply coal to WPL's Nelson Dewey plant from the Antelope mine. Some of this coal will be burned both alone and some will be blended with a high-Btu coal in tests that will occur this summer.

R. Some 200,000 tons of coal from the Rochelle mine are being tested at Illinois Power Company's Baldwin, Illinois, Unit No. 3 plant. A five-week test of the coal began in late June. The coal will be blended with varying amounts of high-sulfur coal from Peabody Coal Company mines in the Illinois Basin. The Rochelle coal will also be tested alone.

S. Rochelle Coal Company furnished coal from the Rochelle mine to Associated Electric Cooperative Inc.'s power plant at New Madrid, Missouri, for testing that was done in October, 1990. This older test shipment is included now because it was not noted last year.

T. Coal from five mines in the Powder River Coal Field is currently being supplied to Tennessee Valley Authority (TVA) for testing at two power plants in their system. Additional testing of Powder River coal at TVA's Allen power station near Memphis, Tennessee, is expected this fall. Most of TVA's test burns have used various blends of low-sulfur, western coal with high-sulfur eastern coal.

U. In April, Amax Coal Company's Belle Ayr mine supplied an additional 20,000 tons of test coal to NIPSCO's Michigan City, Indiana, power station. Last quarter the Michigan City power station used 40,000 tons of Belle Ayr coal in test burns.

V. Unidentified coal mines in the Powder River Coal Field are expected to provide future test coal for several plants in American Electric Power Cooperative's generating system. Two power plants where test burns may occur are Indiana-Michigan Electric Company's Clifty Creek, Indiana, plant and Ohio Valley Electric Corporation's Kyger Creek, Ohio, plant.

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## INDUSTRIAL MINERALS AND URANIUM UPDATE

### Aggregate (Construction)

Because most highway and other outdoor construction projects occur in warmer weather, production of construction aggregate increases in the second quarter of the year. In Wyoming, the production of construction aggregate continues at about the same level as the last two previous years, which means production of construction aggregate should reach 6,000,000 tons again this year. According to the U.S. Bureau of Mines, the production of construction aggregate, nationally, is at its lowest level since 1988.

The railroad ballast quarry at Granite, west of Cheyenne in Laramie County, has been sold to a new owner. The quarry was operated for over 50 years for the Union Pacific Railroad. It was purchased a few years ago by Meridian Minerals, a division of Burlington Norther, Inc. All of Meridian's industrial minerals properties were sold earlier this year. The ballast operation will operate using the name Meridian Industrial Minerals.

Lamb Construction of Torrington, Wyoming, has reopened the Bald Butte ballast quarry south of Lusk. Chicago North Western Transportation Company needs about 500,000 tons of granite ballast to upgrade a portion of their trackage this year.

### Bentonite

Bentonite production in Wyoming continues to increase at a moderate rate. In 1990, Wyoming companies produced over 2.4 million tons, an increase of about 9 percent over 1989. Bentonite is a clay material used in many products, but mostly in drilling mud. Primarily because of a steep decline in domestic drilling, the production of bentonite in Wyoming fell from almost 5 million tons per year in 1981 to less than 2 million tons in 1986. Since 1986, bentonite production has increased slowly due to the development of new uses for the product. Bentonite is now finding more use in barriers to isolate wastes, in containment structures, and as a cleaning and adsorbing agent for industrial chemicals. The Wyoming bentonite industry is operating at about 60 percent capacity according to bentonite producers. Bentonite production should increase again in 1991, and Wyoming will remain the Nation's leading producer.

### Decorative stone and aggregate

Sunrise Stone cut the first block of black granite (amphibolite) from a quarry in northern Albany county in late June. The 5' x 5' x 8' block will be shipped to a stone-cutting plant in Arkansas. There it will be cut into 1-inch to 3/4-inch thick slabs. These slabs will be polished and sold as decorative facing. Sunrise Stone plans to produce many similarly sized blocks from the quarry this year.

The Geological Survey of Wyoming located the black amphibolite quarry site for Sunrise Stone. The Wyoming Department of Commerce's Division of Economic and Community Development provided a grant to the Town of Guernsey to assist Sunrise Stone in beginning production.

Sunrise Stone and several companies remain interested in producing decorative stone in Wyoming. Mesa Marble, of Powell, Wyoming, is testing the production of brown, pink, and yellow marble from localities in Washakie County. In June, several samples of buff and white flagstone from Carbon, Niobrara, and Platte Counties were shipped to Colorado for test marketing.

### Gypsum

According to the Wyoming State Inspector of Mines, the 1990 production of gypsum in Wyoming was 436,367 short tons. Because the two producers of gypsum wallboard in the Bighorn Basin, Celotex and Georgia-Pacific are operating at close to plant capacity, future increases in production are unlikely unless the companies expand their plants. Mountain

Cement at Laramie mines less than 50,000 tons of gypsum annually for use in portland cement.

**Limestone and Lime**

Limestone, a rock composed primarily of the mineral calcite (calcium carbonate), is used as construction aggregate, cut stone, and also as the raw material in the production of lime. Lime is used in a variety of products from fluxing agents in steel refining, to emissions control at power plants, to soil conditioning. The mineral-filler industry is another market for lime that could increase greatly in the next few years. Mineral fillers are finely ground rock and mineral substances. They are used in products to give weight, to improve texture or color, or to take the place of more expensive essential materials. Silica is one of the most commonly used mineral fillers. Its use, however, is likely to decline due to health hazards reportedly caused by breathing finely ground silica. Lime could be substituted for silica where it was used as a filler in many products, including plastic, rubber, and paper.

Pete Lien and Sons, Inc. has been testing limestone near Laramie for source material for a lime plant. A quarry site three miles east of Laramie had been proposed, but the location raised protests from nearby residents. The company recently tested limestone at a second site on State land about 11 miles northeast of Laramie. This second site was found to contain sufficient resources of good quality limestone (98 percent calcium carbonate), and Pete Lien and Sons, Inc. has announced that it is now planning to locate the quarry and lime plant at the second site.

It was reported in the last *Quarterly Update* that Dakota Coal was planning to construct a lime plant at the Bass limestone quarry, 25 miles north of Guernsey. Due to recent developments in the markets for lime, several sites for the lime plant, including the Bass site, are now under consideration. According to company officials, the other locations are all in Wyoming.

**Leonardite**

Leonardite is a substance produced by the oxidation of coal or lignite. It is a sticky, brownish-black organic material used in drilling fluid and wood stain. Black Hills Lignite, an operating division of Black Hills Bentonite, produces and refines leonardite near Glenrock. In 1990, over 41,000 tons of leonardite were mined in Wyoming.

**Trona and Soda Ash**

The amount of trona mined in 1990 was just under the record set by the tron[illegible]es in 1989. According to data from the Wyoming State Inspector of Mines, 16,172,539 tons of trona were mined in 1990, compared to 16,187,732 in 1989. The magazine *Industrial Minerals* reported that dense Wyoming soda ash was selling for $93 per short ton (FOB plant) in April, 1991, up from about $80 per short ton in early 1989.

The trona industry continues to expand its product line. In past years, the trona refineries only produced soda ash. Now, the five companies operating in the trona district west of Green River produce soda ash, caustic soda, sodium sulfite, sodium bicarbonate, sodium cyanide, and Tenneco recently announced plans to produce calcined trona.

Calcined trona is trona that is heated to drive off some impurities. Since calcined trona is not fully refined like the other products produced from mined trona, its sale price will be less than other products produced from mined trona. Calcined trona can be substituted for more expensive soda ash in the production of caustic soda, and may be substituted for soda ash in other uses.

Workers at the FMC plant struck over a contract dispute on the first of May. FMC's total output may be a little less than expected in 1991 due to the strike. Despite the strike, FMC mined its one hundred millionth ton of trona in May. The FMC mine has been operating since 1948.

**Uranium**

According to the Wyoming State Inspector of Mines, Wyoming produced 107,024 short tons of mined uranium ore and 1,047,813 pounds of yellowcake from three solution-mining operations in 1990. Overall production was essentially unchanged from 1989.

The spot market price of uranium continues to drop. At the end of June, the price of $U_3O_8$ was $9.10, down from $9.50 at the end of March.

Pathfinder Mines, a subsidiary of the French Company COGEMA, operates the only active open pit uranium mine and conventional mill in Wyoming. Production from this property in the Shirley Basin of northern Carbon County ceased during a part of 1990 while a new ore body was uncovered. The mine and mill are now fully operational.

Most of the production from solution mining in 1990 was by Power Resources, which is wholly-owned by Nuclear Electric, Ltd, a British company. They produce yellowcake from the Highland mine area in Converse County. Power Resources has been adding to its area of operations. Recently, the company constructed a new solution mining field at the site of the North Morton Ranch deposit, northwest of the Highland deposit. In May, 1991, Power Resources purchased property containing proven uranium resources in the Gas Hills, in southeastern Fremont County. The company noted that it would not develop the Gas Hills property until the demand and price for uranium improves.

The other 1990 producers of yellowcake from solution mining operations were Total Minerals, a French company which purchased Malapai Resources, and Rio Algom, which is owned by RTZ, a British company. Total plans to resume production from its Irigary and Christiansen Ranch properties southwest of the Pumpkin Buttes in 1992. Rio Algom continues to test and develop a recovery operation at the Bill Smith mine site in Converse County.

**Zeolites**

U.S. Zeolite, in partnership with Colorado Lien, continues to test their clinoptilolite deposit near Fort LaClede southeast of Bitter Creek, in Sweetwater County. Zeolites act as molecular sieves and can remove selected ions, including toxic ions from water solutions. The Wyoming Department of Commerce's Division of Economic and Community Development is financially assisting the research and testing of clinoptilolite. The partnership has mined about 200 short tons of clinoptilolite to date.

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## METALS AND PRECIOUS STONES UPDATE

Even though the mining industry is suffering through another deep recession, some exploration for metals was reported around the State. Probably, the most notable news during the past quarter was a claim-staking rush in the Hartville uplift in eastern Wyoming. Three, and possibly as many as four, mining companies were competing with one another to acquire as much mineralized land as possible.

The 1991 field season finally began for the Metals and Precious Stones Division of the Geological Survey of Wyoming (GSW), following many Spring thunder storms and a few tornados. In addition to the tornados spotted by Laramie residents along the edges of town, a smaller tornado was also observed on June 5th during field work at Cooper Hill. Runoff from the Spring storms has caused severe flood damage in some areas, making access difficult.

**Cooper Hill, Medicine Bow Mountains**

The GSW has begun detailed mapping of the historic Cooper Hill mining district. The district was finally mapped by Schoen (1953). Based on Schoen's mapping and recent mapping by the GSW, the district is best described as a faulted and synformal sequence of Proterozoic metasedimentary and metaigneous rocks. According to a regional map by Karlstrom and others (1981), the principal Proterozoic formations underlying the district are the Cascade Quartzite and Vagner Formation. The sequence includes metalimestone, quartzite, thin quartz-pebble metaconglomerate, mica schist, metagabbro, and metabasalt. The district is nearly surrounded by Tertiary conglomerates of the Ferris and Hanna formations.

Mineralization reportedly includes argentiferous galena, some gold, and minor copper (Schoen, 1953). Additionally, one sample of calcite collected from a dump from a prospect pit at the apex of Cooper Hill contained minor disseminated franklinite [(Zn, Mn, Fe)(Fe, $Mn)_2O_4$]. This mineral was initially identified in hand specimen, then later confirmed by x-ray diffraction. The sample also contains traces of a brownish-green, strongly fluorescent, unidentified mineral (possibly willemite). The calcite fluoresces reddish-orange. Follow-up reconnaissance studies in the area have not found any additional franklinite. The source of the franklinite at this point is unknown.

The GSW is currently remapping the district and examining all historic mines and prospects. Dozens of samples are being collected for assay, whole-rock analysis, and geochemistry. To date, vein and skarn mineralization has been identified.

**Hartville uplift**

According to local newspapers, three, and possibly as many as four, major mining companies joined in a claim-staking rush for several massive sulfide and unconformity-related targets in the Hartville uplift of eastern Wyoming. Claims were staked over land with potential for zinc-, silver-, and gold-bearing mineralization and also over areas where Woodfill (1987) reported electromagnetic anomalies. The Hartville uplift is interpreted as an Archean eugeoclinal terrane formed of metadolomite, metabasalt, metagreywacke, and hematite schist. The uplift has been mapped in detail by Snyder (1980) with a geological summary by Snyder and others (1989). The mineral resources have been summarized by Woodfill (1987) and Hausel (1989).

In its early history, the Hartville uplift was initially mined for copper and yielded at least 1,568,000 pounds of copper and 2,280 ounces of silver. In 1898, the district began producing iron ore until the last iron mine closed in 1981. A minimum of 45 million tons of hematite ore were recovered from the uplift.

**Rattlesnake Hills, Granite Mountains**

The Rattlesnake Hills in the granite Mountains include a small Archean supracrustal belt that has been intruded by as many as 42 Tertiary alkalic and calc-alkaline volcanic vents and related instrusives. There were no reports of gold mineralization in this area prior to 1982 when GSW geologists identified an Archean pyritiferous quartz vein (metachert) in July of that year. The vein was traced along strike for approximately 500 feet. At that time two composite chip samples from the vein were assayed and yielded 0.13 and 0.22 ounce per ton gold (Hausel and Jones, 1982; Hausel, 1989, p. 60).

While it was thought that American Copper and Nickel company (ACNC) was aware of this 1982 discovery, John T. Ray (personal communication, June 19, 1991) reports that ACNC was unaware of the earlier discovery when they entered the district in the summer of 1983 and made an independent discovery in the same area, based on mapping by Pekarak (1974). At that time, ACNC noted a sequence of pillowed basalt, felsic volcaniclastics, turbiditic metasediments, chert, and banded iron formation, and "subsequent sampling revealed significant gold values and the property was

promptly staked". Gold anomalies were discovered by ACNC in more than one rock type and at more than one locality. Based on ACNC's work, the Rattlesnake Hills appears to be an important Archean and Tertiary terrane with significant (previously unrecognized) gold anomalies.

**Seminoe Mountains**

The GSW resumed mapping in the Seminoe Mountains Archean greenstone belt of central Wyoming in June, but access was very difficult due to erosion of ungraded roads and jeep trails by the Spring runoff. The GSW is currently mapping east of Sunday Morning Creek in a sequence of serpentinites, cumulate serpentinites, and spinifex-textured basaltic metakomatites. Some strong carbonate alteration of the metamorphics has been noted in this area including localized limonitic alteration in a portion of one of the cumulates. The GSW expects to complete its mapping by the end of the summer. A final report on the Seminoe Mountains gold and iron district should be published sometime next year.

**Sheep Mountain, Medicine Bow Mountains**

At the request of a Laramie resident, personnel of the GSW visited a previously unreported copper mine along the southeastern edge of Sheep Mountain on the eastern flank of the Medicine Bow Mountains. This mine was possibly part of the historic Jelm Mountain mining district; however, there is no historic or production data on the mine. Preliminary investigations show the mineralization to occur in veins and breccia veins in granite described as Sherman Granite by earlier workers. Mineralization occurs as chalcopyrite, chalcocite, bornite, malachite, molybdenite, ilsemannite, and flourite. While the ilsemannite ($Mo_3O_8 \bullet H_2O$) is tentatively identified by x-ray diffraction, geochemical analyses are planned to positively identify the mineral. Samples are currently being tested for precious and other trace metals.

**South Pass**

Steve Gyorvary of the Gyorvary Mining Company received a permit to operate the Mary Ellen gold mine at South Pass early this summer. The Mary Ellen mine was developed as an inclined shaft sunk in a quartz vein in metatonalite porphyry in the South Pass-Atlantic City district. Historic reports indicate the vein averaged 0.4 ounce per ton gold and may have produced 6,250 ounces of gold prior to 1911. There may have been some production after 1911 although no records are available (see Hausel, 1991).

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# Agricultural Update

## GENERAL ECONOMY

According to monthly indicators economic recovery from the most recent recession is certain. Civilian employment increased by 300,000 in June and industrial production showed a third straight monthly increase of 0.7%. Disposable personal income and consumer spending rose 0.4% and 0.5%, respectively, by the end of July. The July Index of Leading Indicators was up for the fifth month in a row.

Despite these positive signs of recovery, several important indicators suggest the recovery will be modest by historical standards. Consumer confidence dropped slightly in June, and the personal savings rate for disposable income slipped to 3.6%. This suggests increased consumer spending will be moderate in the fall quarter. Increased purchases in housing and autos are weak. The real estate market is still overbuilt, and lenders continue to be conservative in construction financing. Growth in final demand also continues to be weak which suggests only a moderate increase for business inventories in the next quarter.

Exchange rates for the next quarter are expected to rise slightly, possibly to 1989 levels. The current global situation indicates European economies will continue to be in a state of recession until 1992. Possible increases in exports to the USSR are quite unlikely this next quarter as political developments continue to unfold. All these factors could translate into softer export demand for agricultural commodities over the next several months.

While total receipts to agriculture generally increase as economic growth increases, the slow pace of this recovery suggests only a moderate increase in total receipts for agriculture. The good news is that agriculture, overall, should not be impacted by any major macroeconomic shocks with this modest recovery. If the recovery were to boom, the Federal Reserve Board would likely raise interest rates to slow the rate of inflation. Higher interest rates certainly would not be a welcome visitor for agriculture.

## GRAINS OVERVIEW

A late season weather market for corn has developed this summer as moisture in the Midwest tailed off during the crucial growing period in June and July. These drought conditions have prompted the U.S. Department of Agriculture to cut its estimate of the nation's corn crop by 10% to 7.42 billion bushels from an earlier estimate this spring of 8.2 billion bushels. If this forecast holds it will mean this year's corn crop will be down from about 6.5% from last year.

Total stocks carried over from 1990-91 will be much lower than when widespread U.S. droughts impacted the grain sectors in 1983 and 1988. The ending stocks estimate from the USDA is pegged at 1.225 billion bushels. If the USDA estimate is accurate, this fall's corn carry-over stocks will be about two-thirds smaller than in September 1988.

Normally these fundamentals would suggest a very bullish market for corn. However, corn farmers may not enjoy large price level increases suggested by the low carry-over stocks. The Department of Agriculture forecasts a weaker export market for U.S. corn in the coming year. The USDA estimates corn exports for the year ending August 31, 1992 to be 1.65 billion bushels. This would be the lowest export level since the mid-1980's.

Corn prices will likely average between $2.40-$2.50 per bushel this fall. If the corn crop continues to deteriorate in the Midwest due to drought, and exports strengthen above current expectations we could easily see a price rally for corn in the winter and spring months. The

markets will be especially sensitive to any threat of adverse weather in 1992.

The supply and demand projections for U.S. wheat indicate that wheat prices should average $2.80-$2.90 per bushel this year which is higher than the national average price of $2.61 for the 1990-91 marketing year. Total wheat supply in the U.S. is down 11.5% from last year. Current projections for the U.S. stocks-to-use ratio for 1991-92 is 24.3%, down approximately 30% from last year.

World wheat production is projected to be 556 million metric tons, a decline of just over 6% from last year's record crop. World wheat ending stocks are projected to decline by less than 1 million metric tons, but the stocks of some major exporting countries other than the U.S. could increase by nearly 6 million metric tons. Overall, world wheat trade is expected to grow by 4-5 million metric tons this year. This suggests competition for market share between the U.S., Canada and the European Economic Community will intensify this year.

## LIVESTOCK OVERVIEW

The growth rate in the cattle herd has been moderate over the past several years which has translated into tighter feeder cattle supplies and increased prices to producers. This growth rate seems to have accelerated in 1991, however. Cattle and calves inventory was 99.4 million head on January 1, 1991, up 1.3% from 1990. The July 1, 1991 all cattle and calves inventory was 109.8 million head, up 2% from July 1, 1990. Heifers intended for beef cow replacement were up 4% from last year. The all cattle and calves inventory is likely to be as much as 3% larger on January 1, 1992 than the previous year. Cow numbers are likely to increase 2 to 3% over the previous year, and the 1992 calf crop could be 3% larger than 1991's calf crop.

Cattle on feed inventories have been above last year's inventories through most of 1991. The July 1, thirteen-state inventory was nearly 8% larger than last year with most of the increase occurring in the heavy weight categories. Marketings as a percentage of on feed inventories have been below last year virtually all of 1991. The decline in this marketing percentage seems to be a result of feeding cattle to heavier weights before slaughter. This trend will likely continue only as long as the feeding cost of grain remains low relative to the fed cattle price.

Most feeders dipped into the red on the profit side this last quarter. This was a result of optimism concerning slaughter cattle prices when placing cattle into the lots. Fed cattle prices, however, did not meet those expectations and dropped into the low 70's and later declined into the high to mid 60's. The breakevens for those fat cattle were higher than that given the relatively high prices paid for feeder cattle going into the lots. If July and August placements of heavier weight feeder cattle do not become exceedingly high, fed cattle prices should rebound in the fourth quarter.

Fed cattle prices are expected to average between $75-$76 per hundred weight over the next several months. Prices at $80 or above are not expected for the remainder of 1991. This suggests cattle feeders may have to adjust earlier expectations and be slightly less optimistic when placing feeder cattle this fall. The other factor on feeders' minds is the feedgrains situation. The potentially volatile corn market could further reduce feeders' optimism when buying cattle.

Cattle producers across the state have enjoyed several years of very favorable prices, but the market could soften as we move into this fall quarter. Reduced optimism by cattle feeders due to softer than expected slaughter cattle prices, losses last quarter and an uncertain corn market will likely affect feeder cattle prices this fall. The 700-800 pound feeder steers could trade in the $83-$86 range, and the lighter weight steers (500-600 pounds) could sell for $89-$92 per hundred weight this fall. As cattle producers make management and marketing

decisions this fall, they need to pay close attention to the corn market and expectations concerning expansion of the cattle herd.

Sheep producers have received less than favorable prices for their lamb and wool crops this year. Unfortunately, it does not look like 1991-92 will be any better. Large production increases experienced in the first quarter of 1991 kept fed lamb prices below $50.00 per hundred weight. Feedlot lambs for the Western states (125-135 pounds) averaged $48.50-$49.38. Demand for lamb is expected to rise slightly in the next year due to aggressive retail marketing and consumer education efforts by the industry.

Lamb and mutton imports for 1990 totaled 43.2 million pounds, down slightly from last year's 43.4 million pound level. Lamb and mutton imports for the first two quarters of 1991 totaled 32 million pounds, up 30 percent for the same period in 1990. Imports are expected to total 60 million pounds in 1991, a 3.4 percent increase in total imports over the previous year.

Third-quarter feeder lamb prices for 1991 will likely average $52.00-$55.00 per hundred weight, with a wide range of variability between $48.00 and $62.00 per hundred weight. Fourth-quarter prices will likely average in the same $52.00-$55.00 range.

Continued large supply and weak demand sum up the foreign wool situation. Wool production is expected to increase again during the 1990-91 season to a record 7.49 billion pounds, an increase of 0.5%. This increase marks the tenth consecutive year of increased world wool production. Grower stocks are at record world levels. At the beginning of March 1991, grower stocks in Australia, New Zealand and South Africa exceeded 5.25 million bales.

USDA announced that the support price for 1991 marketings will be $1.88 per pound of shorn wool. The support price in 1989 was $1.77. The U.S. price for clean, mill-delivered territory wool rose 15-20 percent in May from the March low, reflecting a similar rise in world prices. World wool stocks will continue to put downward pressure on wool prices throughout the 1991-92 season.

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# Wyoming Economic Forecast Report

## INTRODUCTION

This is a synopsis of the Wyoming Economic Forecast Report. The Wyoming Economic Forecast model is an econometric model. The model provides a forecast base and underlying assumptions as a foundation for soliciting additional expert knowledge. Consensus forecasts by local Wyoming experts may be incorporated to make a final forecast for publication.

The largest share of the data base used in the Wyoming model is taken from the employment and personal income tables produced by the United States Department of Commerce, Bureau of Economic Analysis (BEA), through their Regional Economic Information Service program. Other data sources include the Wyoming Agricultural Statistics Service; the Wyoming State Inspector of Mines; the Wyoming Oil and Gas Conservation Commission; the Wyoming Geological Survey; the United States Bureau of Mines; the United States Department of Energy, Energy Information Administration; and the Wharton Econometric Forecasting Associates data base.

The econometric model is designed from historical data. If circumstances deviate significantly from history, then the model may not be an appropriate forecasting tool. This is the reason for using committees of local experts to review the model forecast and to impose adjustments if there is consensus agreement among the committee members.

## EMPLOYMENT

Total Wyoming employment is forecasted to grow an average 1.3 percent per year from 259,090 in 1990 to 296,950 in 2001. Total employment growth averages 0.9 percent per year for the first six years of the period, and 1.7 percent per year the last five years. Employment in the agriculture sector is forecasted to remain relatively stable over the period, declining at an average annual rate of 0.3 percent. Employment for the services sector and the finance, insurance, and real estate (FIRE) sector are forecasted to grow at average annual rates in excess of 2 percent. Employment in the mining sector is forecasted to grow at an average annual rate of 1.9 percent, while construction employment is expected to grow at a 1.5 percent annual rate. Employment in the remaining sectors grow at rates below the industry wide rate of 1.3 percent per year.

## WAGE RATES

Annual wage rates across all sectors are forecasted to increase throughout the period and will average 4.6 percent annual growth in nominal dollars. In real (inflation adjusted) dollars, wage rates are forecasted to just hold their ground on average. Annual wage rates are forecasted to decrease in agriculture. Wage rates will increase at higher than average levels in mining, construction, manufacturing, wholesale trade, and services. They will increase at lower than average levels in transportation, communication, and public utilities (TCPU); retail trade; finance, insurance, and real estate; and government.

## EARNINGS

Total labor and proprietor earnings are forecasted to grow an average 5.9 percent per year for the 1990-2001 period. Total earnings (nominal dollars) for Wyoming are forecasted to grow from $5 billion in 1990 to $9.39 billion in 2001. Real earnings will increase by an average 1.2 percent per year after adjusting for average annual inflation of 4.6 percent.

## PERSONAL INCOME

Total personal income for residents of Wyoming is forecasted to grow from $7.08 billion in 1990 to $12.65 billion in 2001. Per capita personal income grows from $15,590 to $25,460 between 1990 and 2001. In nominal dollars this is an average annual growth rate of 4.6 percent for per capita personal income. After adjusting for inflation of 4.6 percent per year, real per capita personal income stays at the same relative level.

## - SERVICES

The service sector shows the most growth of any sector from 1990 to 2001. Employment rises an average 2.1 percent per year, while annual wage rates rise 6.3 percent per year in nominal dollars (1.6 percent per year in real dollars), and total earnings increase 8.5 percent per year (3.8 percent per year in real dollars). This performance reflects the national trend of strong growth in the service sector.

## MINING

Because of its importance as a primary driver of the Wyoming economy, the mining sector has been modelled in more detail than other economic sectors. The main components of the state's mining sector can be identified by examining four major mining industries: petroleum, natural gas, coal, and soda ash (trona).

Coal, natural gas, and petroleum are substitute sources of energy for one another. Price and production levels for these commodities are therefore quite interdependent. Due to the interdependence, a competitive advantage which increases use for any one of these commodities can have a negative effect on prices and production levels for the other two. Competitive advantages can occur from policy decisions, technological change and changing market conditions. This forecast is based on a set of assumptions concerning supply and demand conditions for each of these commodities. To the extent that conditions are different from those assumed, any major changes which greatly enhance price or production for one may do so at the expense of the others.

Petroleum is defined here as crude oil plus condensate. At times in the report, the term "oil" may be used in lieu of "petroleum". In either case, the definition will remain the same. Natural gas (which may also be referred to as simply "gas") is defined here as being primarily methane, and does not include the production of other gases such as carbon dioxide or helium.

The terms "trona" and "soda ash" are often used in concert with one another; however, they are not interchangeable. Trona is the raw mineral which is processed into soda ash. Soda ash is marketed as an intermediate product to manufacturers. Mining employment for trona and soda ash are one and the same. If a person is employed in the mining of trona, he or she is considered to be necessarily employed in the production of soda ash. The price received is the price of the sale product, which is soda ash. Production is initially measured as the production of trona. However, soda ash production is derived by using the accepted industry standard conversion factor of 0.55 (i.e., for every ton of trona produced, 0.55 ton of soda ash is produced).

### MINING EMPLOYMENT

Mining sector employment is forecasted to grow at an average rate of 1.9 percent per year throughout the 1990-2001 forecast period. This growth is led by trona mining, and oil and gas extraction.

#### OIL & GAS EXTRACTION

While the production of oil and gas can be easily separated, it is not feasible to allocate employment between the two since they are often produced together at the same site. Therefore, employment is shown as "oil and gas extraction" while other indicators such as price,

production, and gross value have separate headings for petroleum and natural gas.

Oil and gas extraction has played the largest role in affecting overall economic conditions within the state over the past twenty years. The OPEC oil embargoes in 1973 and 1979 caused energy prices to skyrocket and resulted in the ten year energy boom in Wyoming. Employment in this subsector more than tripled between 1970 and 1981. Rapidly declining oil prices in 1983 and again in 1986 caused oil and gas employment to subsequently drop by nearly 60 percent between 1981 and 1989. This sector directly accounted for an employment growth-reduction cycle of approximately 15,000 workers in fifteen years between 1974 and 1989. Oil and gas employment is forecasted to increase through the forecast period at an average annual rate of 2.0 percent.

COAL

Coal mining employment has not had as dramatic an effect on the economy as has employment for oil and gas extraction. In relative terms it grew by over 1000 percent between 1970 and 1981, going from 580 to 6,520. However, in absolute terms this increase of 5,940 employees is much smaller than the corresponding increase from oil and gas. Still, it is very significant. Since 1981 coal mining employment has dropped marginally, in spite of increasing production year after year. Even so, it has been an element of stability in the overall Wyoming economy at a time when other sectors have been declining even more rapidly. Coal mining employment is forecasted to increase slowly at an average annual rate of 0.6 percent throughout the forecast period. While continued strong production increases are forecasted, continued increases in productive efficiency are also expected to occur, negating the higher rate of employment growth which might otherwise be expected.

TRONA/SODA ASH

Trona mining has become an important component of the mining sector. In 1970 the trona mining industry employed just over 1,000 workers. The industry peaked at 4,000 employees in 1981 and then declined to 2,610 in 1986. While the industry did experience a slump at the same time as the rest of the Wyoming mining sector, trona mining did not collapse as badly as other mining segments, and it has rebounded some since 1986. Trona mining employment was 2,940 in 1989. Employment for this industry is forecasted to grow at an average annual rate of 4.2 percent and attain a level of 4,550 in 2001.

OTHER MINING

"Other mining" includes all other types of metal and non-metal mining activity. From an employment standpoint, uranium, iron ore, and bentonite have played major roles in this subsector. "Other mining" employment as a composite subsector increased from 3,400 in 1970 to a peak of over 8,540 in 1979. The subsequent employment decline started earlier in this sector and was led by the decline in uranium mining, which began in 1980. Wyoming lost approximately 5,000 uranium mine workers between 1980 and 1984. Bentonite, another mining product, is used as a drilling mud in oil and gas well drilling. Employment in bentonite mining began to drop in 1983, coinciding with the drop in oil and gas drilling activity. An iron ore mine at Atlantic City in Fremont County also closed in 1983 and laid off over 400 workers. By 1988 employment in "other mining" had declined from a peak of 8,540 in 1979 to 1,460. Employment in "other mining" is forecasted to increase until 1994 when it reaches 2,420. It then decreases to 2,110 workers in 2001.

**MINING PRODUCTION**

PETROLEUM

The trend for gross production of petroleum has been a decline since 1970, though there have been short periods of production growth. Annual petroleum production for 1970 was 155 million barrels. This decreased to 109 million barrels in 1989. Petroleum production

is forecasted to continue a gradual annual average decline of 2.4 percent throughout the forecast period. Annual production is forecasted to drop to 80 million barrels by 2001.

NATURAL GAS

Natural gas production grew through the historic period with a few year-to-year drops. Natural gas production is forecasted to continue with steady growth through 1991. Beginning in 1992, gas production is expected to substantially increase. This large increase in production will result from construction of one or more new natural gas pipelines that will carry Wyoming natural gas to consumers in Southern California. Two proposed pipelines have been approved for construction by the State of Wyoming. This forecast assumes the construction and subsequent use of at least one of these pipelines. Furthermore, we assume an increase in production of 500 million mcf to meet demand from this new market. The average annual increase for the forecast period is 5.1 percent.

COAL

Coal production grew steadily over the historic period with one small drop in 1986. Coal production is forecasted to grow at a continued strong pace of 3.5 percent per year through the forecast period. Gross production will increase from 184 million tons in 1990 to 268 million tons in 2001.

TRONA/SODA ASH

Soda ash production steadily increased from 1970-1989, with more pronounced increases occurring from 1986-1989. Soda ash production is forecasted to grow an average 5.2 percent annually from 9.3 million tons to 16.3 million tons between 1990 and 2001.

**MINING PRICES**

PETROLEUM

Petroleum prices show steep increases in 1973-1974 and again in 1978-1981 due, respectively, to the 1973 OPEC oil embargo, and the 1979 OPEC oil embargo and uncertainty in the Middle East with the Iranian Revolution and U.S. hostage crisis. Prices decreased steadily from 1982 through 1985, dropped dramatically in 1986, and fluctuated between 1987 and 1989. Prices are forecasted to climb at an average annual rate of 5.1 percent through the forecast period. In constant (inflation adjusted) dollars, this is an average annual increase of 0.4 percent per year.

NATURAL GAS

Natural gas prices have shown a trend similar to that of petroleum, except that they seem to lag a year or two behind. Like petroleum, natural gas prices are forecasted to continue upward through the forecast period, but at the higher average annual rate of 10.4 percent (5.5 percent in constant dollars), rising from $1.59 in 1990 to $4.70 per mcf in 2001. Some of this may be attributed to increased demand for natural gas as an alternative fuel for increasingly expensive oil and also as a clean alternative for high sulfur coal.

COAL

Coal prices show a steady increase from 1970-1982. Since 1982, coal prices have fallen in much the same fashion as oil and gas prices. We now believe that coal prices have bottomed out and that they will increase at an average annual rate of 3.7 percent through the forecast period, rising from $8.29 per ton in 1990 to $12.34 per ton in 2001. However, this increase does not exceed the projected rate of inflation for the forecast period and would translate into an average annual price decline, in constant dollars, of 0.9 percent per year.

TRONA/SODA ASH

Soda ash prices climbed from 1970-1981, sustained a short two year decline in 1982-1983, and have risen incrementally from $69/ton in 1983 to $93/ton in 1989. Prices are

forecasted to rise steadily at an average annual rate of 3.3 percent throughout the forecast period from $93.00 per ton to $133.45 per ton. This is also below the rate of inflation, and would equate to a price decline of 1.2 percent per year in constant dollars.

## AGRICULTURE

Agriculture is another sector which is generally viewed as a primary driver of the Wyoming economy. Therefore, additional detail has been included for this sector. Agriculture is considered a primary driver not because of the relative size of the industry in comparison to other economic sectors, but because agriculture initiates economic activity in other sectors by creating new dollars or attracting new dollars into Wyoming's economy through out-of-state sales. Part of this effect is the generation of support businesses such as transportation, storage, and processing that can be directly related to agriculture as well as the increased need for more general goods and services that come with an expanded economic base.

### AGRICULTURE EMPLOYMENT

Total agriculture employment has been fairly stable throughout the period 1970-1989. Agriculture employment ranged from 15,860 to 17,160 between 1970 and 1984. Since 1984 it has been closer to 15,500 and reached a low of 15,330 in 1989. In this report agriculture employment has been broken into farm employment and agricultural services employment. Farm employment includes both farm proprietors and farm labor (wage and salary workers). Agricultural services employment includes those persons working in agricultural services, forestry, fishing, hunting, and trapping.

During the period 1970-1983, total farm employment remained fairly stable, fluctuating between 13,720 and 15,180. Since 1984, however, there has been a slow, steady decrease to 12,340 in 1989. Farm employment is forecasted to decline at an average annual rate of 0.6 percent and will diminish to 11,700 by 2001.

Employment in agricultural services increased steadily from 1970-1984, before tapering off very slightly in 1985 and 1986. Beginning in 1986, agricultural services employment expanded, reaching 3,000 employees in 1989. Agricultural services employment is forecasted to increase again in 1990 before subsiding in years 1991-1995. It is forecasted to begin growing again in 1996 and to continue growing through 2001, when it reaches 3,410 workers.

### FARM INCOME & MARKETING RECEIPTS

Farm market receipts include cash receipts received for all commodities in Wyoming. The predominant cash commodity in Wyoming has traditionally been beef cattle. Receipts from the marketing of beef cattle and calves has accounted for an annual average of 69 percent of total farm market receipts over the period 1970-1989.

The volatile nature of the farm industry is seen by looking at historical data from 1970-1989 for both gross farm income and farm market receipts. In that period of time, gross farm income has seen a low of $289.8 million and a high of $977.5 million. Farm market receipts have fluctuated between $233.2 million and $855.6 million. In both cases, substantial gains were made throughout most of the 1970's, but the gains were followed by turbulent times in the early and mid 1980's. More recently, a strong upward trend occurred from 1987-1989. The forecast has gross farm income and farm marketing receipts remaining quite stable in current dollar terms. In constant dollars, however, both gross farm income and farm marketing receipts are expected to decrease an average 3.8 percent per year.

### BEEF MARKETINGS

Because of the relative importance of the beef industry within the agriculture sector, the

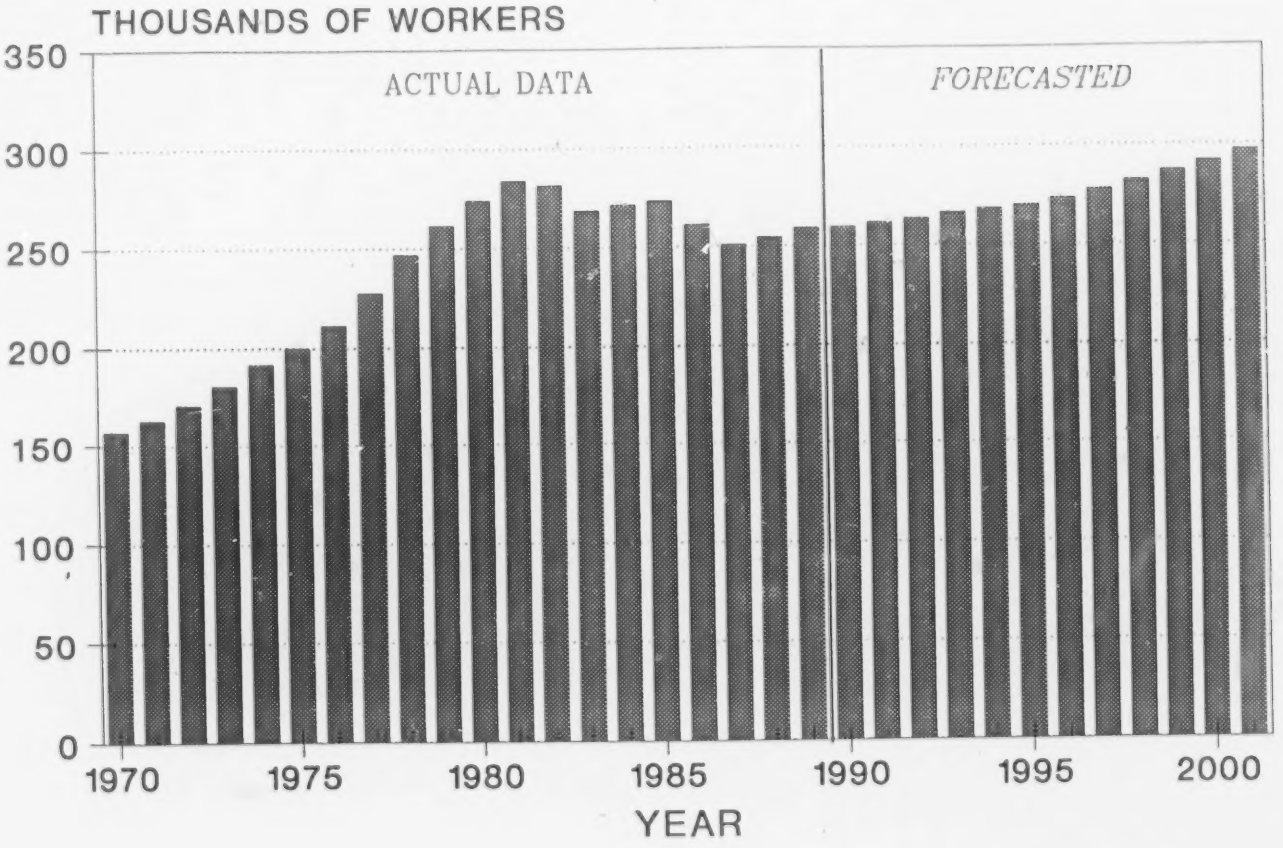
forecast also shows beef marketings in millions of pounds. Beef marketings trended upward throughout the 1970's, although there were some year-to-year declines. Beef marketings dropped off in the very early 1980's but rebounded in 1983 and have remained at levels commensurate with the late 1970's. The forecast shows beef marketings fluctuating through 1995 and then decreasing from 1996 through 2001. The net effect is a very slight average decrease of 0.1 percent per year from 1990 through 2001.

**BEEF PRICES**

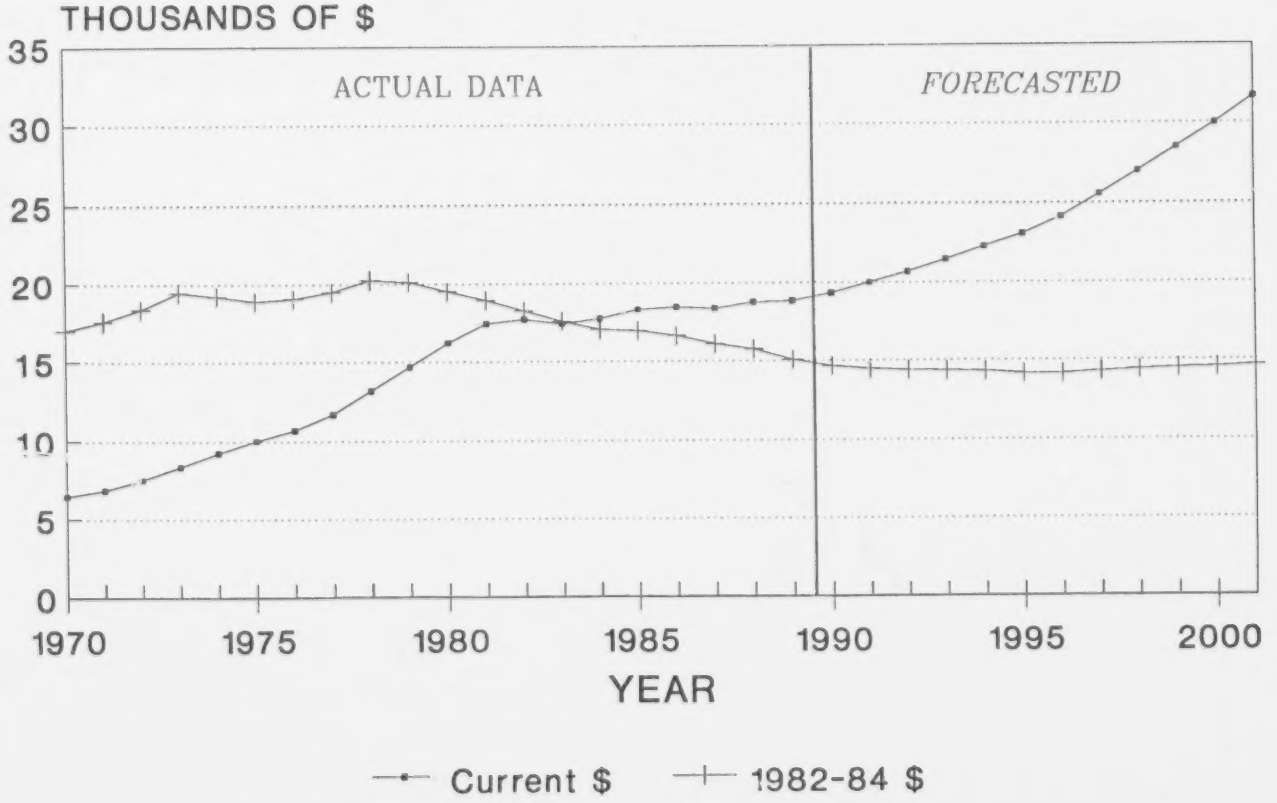
Beef prices in Wyoming generally trended upwards from 1970 to 1979, decreased from 1979 to 1986, and rebounded from 1986 to 1989. In real prices, however, the price for Wyoming cattle generally trended downwards from 1970 to 1989 with the exception of two price spikes in 1973 and 1979. The forecasted Wyoming price for beef increases an average 0.6 percent per year rising from $77.99 per hundred weight in 1990 to $83.02 in 2001. In real (inflation adjusted) prices, however, the price for Wyoming cattle decreases an average 3.9 percent per year from 1990 to 2001.

Steve Furtney
Senior Economist
Kreg McCollum
Economist
Wyoming Department of
Administration and Information

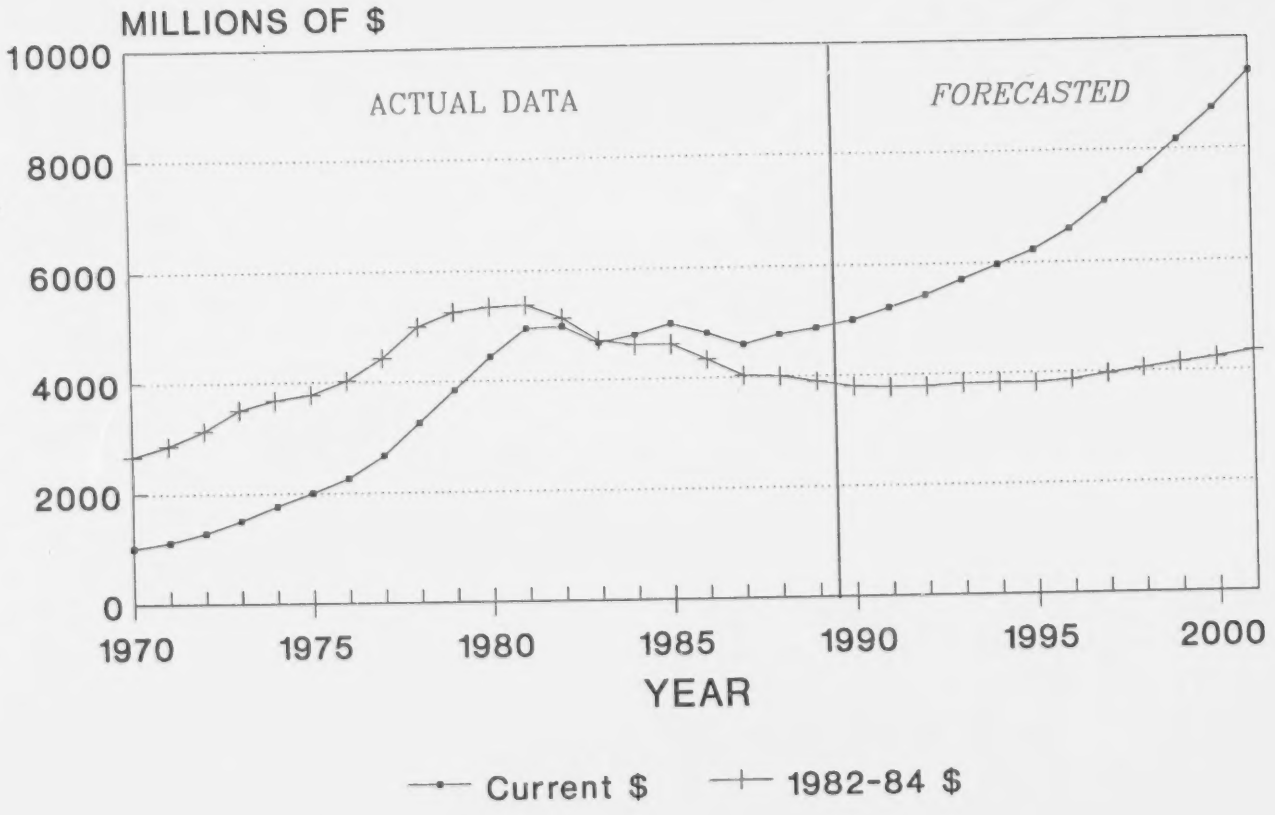
# TOTAL WYOMING EMPLOYMENT
## 1970-2001



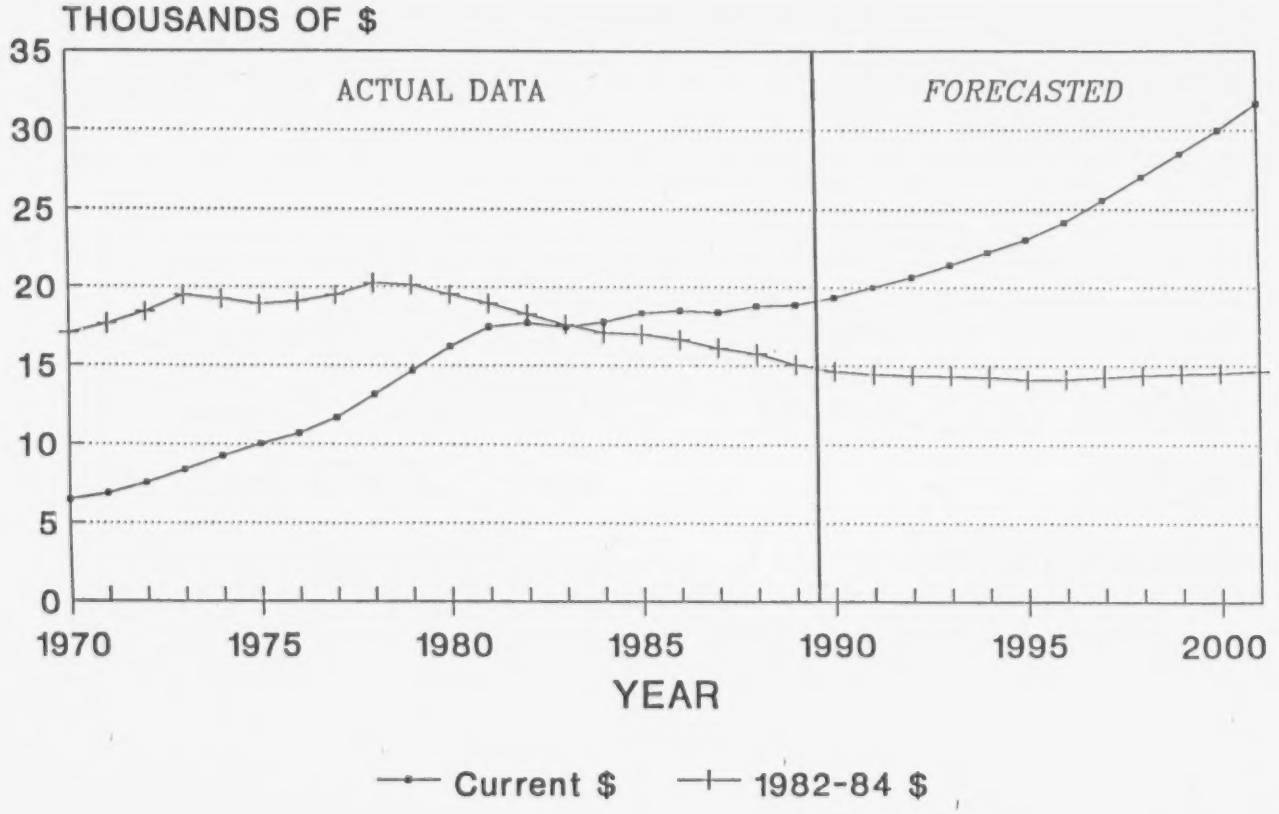
# AVERAGE WAGE RATE--ALL SECTORS
## 1970-2001



# TOTAL EARNINGS FOR ALL SECTORS
## 1970-2001



# AVERAGE WAGE RATE--ALL SECTORS
## 1970-2001



# Job Openings Outlook

## PHYSICAL SCIENTISTS

Physical Scientists investigate and analyze the structure and composition of the universe. Chemists study the composition and properties of matter and the elements which comprise it. They often specialize in such fields as analytical, organic, inorganic, physical, and biological chemistry. Physicists investigate the relationship between matter and energy. Most specialize in an area such as acoustic, optics, nuclear physics, biophysics, or geophysics. Astronomers study planets, stars, and other celestial bodies of the universe.

Physical Scientists must be very thorough in their work. They must pay attention to detail and have a knowledge of scientific theories. It is important that they possess extremely high intellectual, verbal, and mathematical abilities, as well as above average spacial and form perception. Patience, perseverance, and the ability to work independently are also necessary.

This medium-sized occupation employs about 1400 Physical Scientists in Wyoming. Work is performed indoors and outdoors. Some work in laboratories, offices, or classrooms. Others may work outdoors at research sites and may be exposed to hazardous chemicals.

The salary of Physical Scientists varies depending on the type of employer, degree, specialty, and work function. The entry-level wage for chemists is $2,000-2,500/month. Maximum wages range from $3,830-4,000/month. Those employed by the state may start as physical scientist technicians and earn between $1,150-1,500/month. Nationally, earnings vary depending on the specialty.

In Wyoming there is a slight surplus of applicants. The outlook depends on the financial support by government and research foundations for research of energy, pollution, and health care problems; the research and development of new products by private industry; and the state of the economy. Opportunities in Wyoming are limited. The largest employer is expected to be private industry, primarily in new product development and improving industrial processes. Sources indicate that employers are looking for polymer, analytical, organic, and physical chemists and that new jobs will be created at all degree levels. Persons with a bachelor's degree are expected to face keen competition for physicist jobs, while job opportunities for those with advanced degrees are expected to be better. An advanced degree is important for research positions and college teaching positions. Individuals who have had courses in computer science and business administration or who specialize in geophysics will find better employment opportunities. This is due to both the sophisticated techniques being used by petroleum and mining companies to locate 'hard to find' fuel and mineral deposits, and to the expansion of research to find new sources to generate electricity, such as geothermal energy. colleges and universities generate few new positions, so the demand for teachers is largely determined by replacement needs. Students planning a career in the physical sciences should consider relocation as part of their job search. Nationally, employment is expected to improve slightly through the mid-1990's. Job opening in astronomy are expected to be few and the number of degrees granted will likely exceed the available jobs.

## ENGINEERING TECHNICIANS

Engineering Technicians assist engineers in the planning, research, and development of engineering projects or products. Technicians follow well-defined methods and procedures set by supervisors and engineering standards. They often take samples, collect data, do testing and computations, and inspect projects or products.

Technicians may also prepare drawings, research records and assist in writing reports. Engineering technologists apply engineering principles to translate the ideas of engineers and architects into products or functional systems. They are primarily responsible for the technical aspects of a manufactured product or construction project. They may supervise the work of technicians and craftworkers, and oversee the manufacturing or construction activities. Technologists who work for manufacturers may develop a new product, solve the problems of producing the product, and test the product for performance or quality.

Engineering Technicians must have a knowledge of math, particularly trigonometry, and also science and the basic engineering procedures. They must be able to visualize objects of two or three dimensions and do detailed work. It is also important that the technician understand drafting and surveying principles, and be able to use field or office engineering instruments. Potential Engineering Technicians will have an advantage over other applicants if they communicate well, both orally and in writing, and if they are persistent in keeping in touch with companies who employ technicians. Finally, present hiring practices show that most employers require two years of post-high school training or past experience with actual on-the-job training.

This medium-sized occupation in Wyoming employs about 800 technicians. Most of the technicians' work is performed indoors under comfortable conditions. However, the surveying and construction inspecting is performed outdoors.

The entry level salary for Engineering Technicians in Wyoming is around $1,000-1,200 per month. Those with some previous experience earn $1,200-1,500 per month. Depending on the employer, technicians with several years experience can earn as much as $1,700-2,270 per month. Nationally, wages are slightly higher. The majority earn between $19,800-31,600 per year.

In Wyoming there is a balance of qualified applicants. The outlook depends on the state of the economy, the amount of research and development in industries and agencies, and the level of construction activity. Cutbacks and the willingness of engineers to do technician work has created stiff competition for jobs. As the economy improves, increasing construction and mineral exploration, so should employment opportunities for technicians. Nationally, the employment is expected to increase much faster than the average for all occupations through the year 2000 because of increases in research and development expenditures and expected continued rapid growth in the output of technical products.

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Wyoming Career Information Systems

# 1990 Census: Summary Tape File 1 On CD-ROM

Now that the Secretary of Commerce has decided against adjustment of the 1990 Census, release of Summary Tape File (STF) 1 will begin on a fairly new medium, the CD-ROM (Compact Disc-Read Only Memory). The Census Bureau plans to provide some information from the 1990 Decennial Census in this format, which will make Census data accessible on any personal computer equipped with a CD-ROM reader. CD-ROM's contain more information than on four reels of high density computer tape. Projected release date for STF 1A on CD-ROM is August, with STF 1B and STF 1C released in fall 1991.

Information available on STF 1 is summarized in the table below. The difference between A, B, and C is primarily geographical. STF1 A and B both contain information on the State, counties, places, total census tracts, and total block groups. STF 1B also has data on census blocks, metro areas, urban/rural areas, and urbanized areas. STF 1A has data down to the level of block groups; there are over 350,000 block group parts. In contrast, STF 1B has data for about 7 million blocks. Both these files come as State files.

STF 1C is the national file, one file is released for the entire Nation. This file does not have the very small area data you find in 1A and 1B but it does go down to the level of places with 10,000 or more.

**Illustrative STF 1 Table Outlines**

**P6-Race(5)**
*Universe: Persons*
White
Black
American Indian, Eskimo, or Aleut
Asian or Pacific Islander
Other Race

**P9-Hispanic Origin(5)**
*Universe: Persons*
Not of Hispanic origin
Hispanic origin:
- Mexican
- Puerto Rican
- Cuban
- Other Hispanic

**P15-Household Type and Relationship(12)**
*Universe: Persons*
In family households:
- Householder
- Spouse
- Child:
  - Natural-born or adopted
  - Step
- Grandchild
- Other relatives
- Nonrelatives

In nonfamily households:
- Householder living alone
- Householder not living alone
- Nonrelatives

In group Quarters:
- Institutionalized persons
- Other persons in group quarters

**H9-Tenure(2) by Race of Householder(5)**
*Universe: Occupied housing units*
Owner occupied:
- White
- Black
- American Indian, Eskimo, or Aleut
- Asian or Pacific Islander
- Other race

Renter occupied:
- (repeat race of householder)

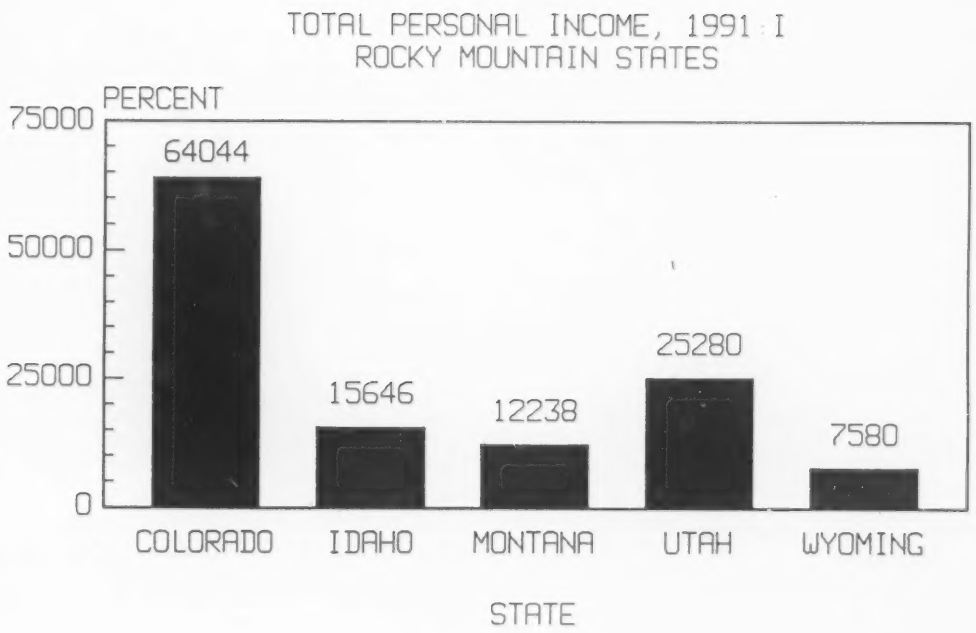
**H12-Tenure(2) by Age of Householder(7)**
*Universe: Occupied housing units*
Owner occupied:
- 15 to 24 years
- 25 to 34 years
- 35 to 44 years
- 45 to 54 years
- 55 to 64 years
- 65 to 74 years
- 75 years and over

Renter occupied:
- (repeat age of householder)

**H43-Tenure(2) by Units in Structure(10)**
*Universe: Occupied housing units*
Owner occupied:
- 1, detached
- 1, attached
- 2
- 3 or 4
- 5 to 9
- 10 to 19
- 20 to 49
- 50 or more
- Mobile home or trailer
- Other

Renter occupied:
- (Repeat units in structure)

# Feature Articles




SOURCE: BUREAU OF ECONOMIC ANALYSIS

# Image Analysis in the Measurement of Properties of Wool and Other Animal Fibers

### Overview and Description

Use of image processing equipment and software is becoming more prevalent in research that attempts to characterize the physical properties of wool and other animal fibers. Image analysis is being utilized to provide a faster, more accurate system of measuring wool fiber diameter and the subsequent variation in fiber diameter. An image analysis system was acquired and set up in the wool laboratory at the University of Wyoming, funded by a special grant from the Wyoming State Legislature. Additional monies were obtained subsequently from the United States Department of Agriculture (USDA) due to the legislative funding received. The image analysis system is made up of various components: a low power microscope, a high quality video camera, image processing hardware with four 512x512 frame buffers, morphometric and densitometric software packages with the ability to select objects by size, shape and density, color monitor, serial mouse device and a Silicon Graphics computer. This system will allow for the measurement of several thousand fibers in a few minutes compared to the present method that requires hours to measure a few thousand fibers. Additionally, a reduction in the number of operators required to measure fibers would be realized, with a corresponding improvement in repeatability of measurements. This system will function in an almost total automatic mode, reducing manpower requirements and increasing the speed and accuracy with which samples could be measured.

There are more uses of this technology in the fiber research area. Areas of research that are enhanced or actually made possible by the use of image analysis are concerned with the following: 1.) measuring the actual mitotic rates of cells that form the fiber; this research will lead to information regarding the controlling mechanisms of fiber production, and, 2.) measurement of depth and curvature of wool follicles which are directly related to crimp formation and subsequent processing capabilities of the fibers. This type of information has been very difficult to obtain because of the inability to accurately measure these parameters. The cortex of wool and other animal fibers is the major component of the fibers and is responsible for many of the physical properties of these fibers. There are three cell types that make up the cortex. Little is known of the distribution of these cells within the cortex and the effects these cells have on structural properties of the fibers. Until now, measurement of these cell types was done by hand, on few fibers, requiring long hours and the subsequent reduction in accuracy due to human error. With the advent of image analysis, these measurements could be carried out on thousands of fibers with minimal labor inputs. The use of image analysis techniques will enhance wool fiber research because of the ability to measure parameters that until now could not be measured on enough fibers to allow statistical analysis or reduce the time and effort to measure fiber properties that subsequently affect the processing capabilities of those fibers.

### Benefit to the Wyoming and National Sheep Industry

Price of wool has historically been determined by supply and demand in combination with subjective assessments of the fiber by the prospective buyer or his agent. Past research has been directed toward each of these three value-determining factors with the usual objectives of improving the market position of the commodities while realizing more profit for the producer. Unfortunately, some of the research is counter productive. Research designed to increase the supply of the commodities might be expected to result in lower prices. Conversely, research performed to increase demand may result in higher prices, though not necessarily to the producer. For at least the past 45 years, research in the third

category, assessment of the fiber by both vendors and buyers, has been directed toward eliminating subjectivity and replacing the art of grading natural fibers with an objective system reliant upon instrumental measurements alone. Although this research effort has been international in scope, to date, only Australia, New Zealand and South Africa have taken significant advantage of the developed objective testing techniques in the marketing of their products. There are numerous reasons why the wool trade in the United States has not changed to a system of marketing based on objective measurements. Resistance to change has been met at the producer, warehousemen and textile mill levels. Similar resistance to change was encountered in Australia and South Africa, but the majority of those producers involved realize that a system of marketing wool based on objective measurements would result in more stable prices which more accurately reflect the value of the fiber. It has been pointed out that the situation in this country is vastly different from those existing in South Africa and Australia. For example, in the United States numerous different breeds of sheep are utilized, resulting in many types and grades of wool in the market place. This is in contrast to the predominantly fine wools which are available from the two previously mentioned countries. Further, some objective measurements take a considerable length of time to perform and cause extra expenditure to the producer. These facts, together with the current co-existence of several different marketing systems, even within the states, have resulted in very low acceptance of objective measurements as a marketing tool in the United States. The majority of cotton farmers on the High Plains of West Texas have accepted instrumental testing of their product as a desirable prerequisite to marketing following years of resistance. At last, the producer is being paid for the quality of the product he grows. This is not always the case when subjective assessments are made.

A great deal of work remains in developing techniques for objectively evaluating wools rapidly and effectively demonstrating that a marketing system for wool based on objective measurements would be advantageous to producers, manufacturers and consumers in the United States. Part of this work can be achieved via extension since much of the basic research has been completed and tested in other countries. However, some applied research and development is still required, particularly in the area of developing and adopting a rapid system of objective measurements which would be suited to the situation in this country.

Objective measurement of wool fibers has been readily accepted and utilized by the scientific community. Researchers in the areas of sheep management, nutrition, production, health, performance and selection for breeding all require accurately measured fiber properties on a routine basis. The effects on fiber properties should be considered in any research project concerned with animals whose commercial value is based primarily or secondarily on the fibers they produce. Current methods of measuring fiber diameters are tedious, arduous to technicians and are subjected to operator error due to eye strain, this tends to inhibit researchers from including fiber information in research projects. Another problem which probably has more influence on researchers is the lack of availability of the equipment necessary to measure fiber diameters according to American Society of Testing Materials (ASTM) D2130 procedures.

It is emphasized that certain changes within the present systems of producing and marketing wool would be advantageous to all parties. Objective measurements are expected to particularly benefit the rancher who is attempting to produce, prepare and market a superior product. However, the industry needs research assistance in developing better selection, nutrition, management, harvesting, preparation and marketing systems for increasing the value of wool. The major phase of this research project will be designed to result in improvement and greater utilization of Wyoming and U.S. wool through the use of objective measurements. Improvement in equipment used to describe wool fibers with respect to increased speed and accuracy is essential if domestic wools are going to compete with imported wools on an economic basis. The utilization of this type of

equipment would aid the Wyoming and U.S. sheep industry tremendously from the wool marketing standpoint by providing fast, accurate information at a reasonable cost.

Table 1 provides a summary of the value of various wools according to their diameter for the years 1987 and 1988. This information was extracted from the Market News Reports published by USDA Agricultural Marketing Service, Greeley, Colorado. The importance of having a rapid, accurate method of measuring wool fibers is demonstrated by the differences in value of wools that are separated by .01 micron. Wools in the 20.6 to 22.04 micron category have a value in the range of $4.00 to $5.00 while wools in the 22.05 to 23.49 micron range have a value of between $3.25 and $4.00. When one considers the economic impact of this type of difference in value to producers, it is imperative that the producer has access to the data describing his wool in a prompt and accurate fashion. The finer grades of wool (20.60-22.04 microns) are affected the most, but the trend is present in the coarser grades.

## Literature Review

Average fiber diameter and variability of animal fibers are two of the most important characteristics used in the classification, evaluation, marketing, and spinning of the fiber (Pohle, 1975; Whiteley and Jackson, 1982). Information on wool characteristics of individual sheep is also valuable to the sheep breeder for use in selection programs. Since heritability of fiber fineness is quite high, rapid change in the average fiber diameter of a flock over a generation interval is possible; or average diameter of the flock can be maintained at a constant value, within environmental limitations provided it is measured correctly. Accuracy is important since the heritability of any trait decreases as the accuracy of measurement decreases thus slowing the response to selection.

The development of rapid, accurate, repeatable standardized methods of sampling and testing has continued to determine various quality characteristics of animal fibers (Pohle, 1961). Objective measurements have been used for some years using micrometre (micron-μm) to describe fiber diameter and variability specifications when marketing and evaluating wool and mohair top. In recent years, average fiber diameter has been used for describing, marketing and evaluating raw greasy wool (scoured before testing) on an 'objective micrometre basis' worldwide. It was estimated that Australia marketed 99% of its 1983/84 wool clip on a descriptive basis (Slack-Smith et al., 1985).

Fiber diameter is recognized as the most important physical attribute of raw apparel wool in determining the type of fabric into which it may be processed. Measurement of fiber diameter continues to be the most labor-intensive, time-consuming effort of describing wool. Since the wool industry needs accurate information, precise and fast methods must be developed. Numerous attempts have been made to increase the speed with which animal fibers may be measured. These procedures have saved time somewhat; however, they lack accuracy as a viable tool for use by the producer and industry and they do not provide an estimate of variability. New developments in the electronic industry may increase the speed, decrease cost, and reduce tediousness and fatigue associated with current methods of measuring fiber diameter.

Procedures to measure mean wool fiber diameter have been divided into two classes, based on relative accuracy and rapidity (Anonymous, 1952). These classes are: (a) precision methods and (b) rapid methods. The projection microscope techniques are precision methods specified by the International Wool Textile Organization (IWTO) and the American Society for Testing Materials (ASTM). These procedures emphasize accuracy in measuring mean diameter and calculating variation in diameter. They require considerable time, and are tedious and fatiguing to operators.

The IWTO and ASTM projection microscope techniques measure the diameter of fiber segment images (IWTO, 1967; ASTM, 1988). In both techniques, the projection microscope, which is similar to an inverted

microscope, is adjusted to produce a magnification of 500X in the plane of the projected image whereby 5 mm is equal to 10 μm. Samples are compressed and cut according to specified procedures. The fiber segments are prepared for image projection by dispersion in oil on a glass slide covered by a coverslip.

A wedge scale calibrated to provide measurements expressed in μm is used to measure the fiber image diameter. The minimum number of fibers to measure to obtain the mean fiber diameter and variability is dependent upon fiber diameter variation of the sample and the procedure used. Grade specifications are determined according to the mean fiber diameter and variability. Only the IWTO and ASTM projection microscope techniques provide measurements of variation in fineness as well as mean diameter (Pohle, 1961). Currently, the only commercially accepted methods of estimating the average diameter of wool fibers in a commercial lot of wool or individual fleece is defined in ASTM test method D2130: Diameter of Wool and Other Animal Fibers by Microprojection, and IWTO-8-66(E): Method Of Determining Wool Fibre Diameter By The Projection Microscope. Both methods involve detailed procedures used in measuring fiber diameters.

The rate of wool growth in Merino sheep is closely related to nutrient intake (Marston 1948; Ferguson et al., 1949; Schinckel 1963). This response in wool fiber production reflects alterations in follicle activity; in particular, changes occur in the number of cells produced per unit time within the follicle bulb and the subsequent migration and growth of the fiber cells (Schinckel, 1962; Fraser, 1965; Short et al., 1965). Little is known of the relative significance of these various changes in determining wool fiber production. Quantitative studies have shown that the number of cells produced per hour (or mitotic activity) in the follicle bulb is of major importance in influencing fiber output (Schinckel 1961, 1962). Cell proliferation in the germinative compartment of the follicle bulb is a key event in the synthesis of wool and hair fibers (Black, 1987), yet few studies have been made of factors influencing follicle cell birth rate. Difficulties in arresting the metaphase of cell mitosis have restricted the ability of researchers to investigate the causes of increases or decreases in cell proliferation rates. The studies conducted so far have used the so called stathmokinetic technique with colchicine or colcemid as the metaphase arrest agents (Schinckel 1961, 1962; Fraser 1965; Short et al., 1965, Wilson and Short 1979; Hynd et al., 1986; Williams and Winston 1987). The other technique that has been recently utilized is DNA labelling Bromodeoxyuridine (Hynd and Everett, 1990). The isolation and identification of labelled cells in serial cross sections of tissues has been a major obstacle. The accurate determination of numbers of labelled cells is tedious and to this point somewhat arbitrary, as skin sections have to be thick enough to eliminate the problem of counting the same cell twice. Image analysis could be employed to reconstruct the entire follicle bulb using serial sections and the total number and position of the labelled cells determined.

Follicle depth and curvature are highly related to many other fleece characteristics (Nay, 1970; Nay and Hayman, 1969; Nay and Jackson, 1973; Nay and Johnson, 1967). The measurement of follicle depth and curvature is very time consuming and prone to errors because of the need to use a microscope for measurement. Image analysis would provide a means of rapidly determining these characteristics with a future objective of incorporating these measurements in a selection program to select animals at a relatively young age.

The growth of the wool fiber depends upon continuous division of cells within the bulb of the wool follicle. While the rate of production of cells in the bulb can be characterized in terms of the number of cells capable of mitotic activity and the average turnover time of this population of cells, the volumetric rate of fiber production from each follicle also depends on the size and number of cells which eventually make up the cortex of the fiber. The cortex is the major component of most wool fibers and is responsible for many of

the physical properties of wool. There are three cell types which have been identified in the cortex on the basis of their staining properties, structure and keratin composition. These cell types have been called the ortho, para and mesocortical cells (Rogers, 1959; Horio and Kondo, 1953: Fraser and Rogers, 1955: Bones an Sikorski, 1967; Kaplin and Whiteley, 1978; Orwin et al., 1984). Other studies have shown a difference in structure between the cell types (Dobb, 1970; Kulkarni et al., 1971). The arrangement of these types of cortical cells in different fibers or along the same fiber may vary considerably (Fraser and Rogers, 1955; Orwin et al., 1984; Orwin and Woods, 1980). Overall, the evidence suggests that the proportion and distribution of cortical cell types may influence fiber properties. Determining the cortical cell proportions and their arrangement in the cortex is quite involved and time-consuming and does not lend itself or measuring the large numbers of fibers required for statistical analysis. Some preliminary work has been done evaluating the use of image analysis techniques utilizing main frame computers (Orwin and Bailey, 1988). This work has shown the feasibility of utilizing imaging technology for the measurement of cortical cell size, determining the proportion of the cortex each cell type makes up and the distribution of these cell types along the fiber. There are more powerful imaging systems available now that will further reduce the time needed to perform these measurements and also make use of PC based systems rather than the main frame system Orwin and Bailey used.

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Table 1. Average Prices Received for Clean Wool by Year, Month and Micron Category

| | Micron Category | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (64's) 20.60-22.04 | | (62's) 22.05-23.49 | | (60's) 23.50-24.94 | | (58's) 24.95-26.39 | | (56's) 26.40-27.84 | |
| Year: | 1988 | 1987 | 1988 | 1987 | 1988 | 1987 | 1988 | 1987 | 1988 | 1987 |
| January | 2.85-3.35 | 1.90-2.00 | 2.30-2.80 | 1.70-1.90 | 2.00-2.30 | 1.50-1.70 | 1.80-2.00 | 1.40-1.50 | 1.60-1.80 | 1.35-1.45 |
| February | 3.50-4.25 | 1.90-2.00 | 2.75-3.50 | 1.70-1.90 | 2.50-2.75 | 1.50-1.70 | 2.25-2.50 | 1.40-1.50 | 1.75-1.90 | 1.35-1.45 |
| March | 4.10-4.60 | 2.10-2.35 | 3.00-3.75 | 1.90-2.00 | 2.50-2.75 | 1.60-1.80 | 2.25-2.50 | 1.45-1.55 | 1.90-2.00 | 1.40-1.50 |
| April | 4.25-5.00 | 2.50-2.75 | 3.25-4.00 | 2.30-2.60 | 2.75-3.25 | 2.00-2.25 | 2.25-2.75 | 1.80-2.10 | 2.00-2.25 | 1.70-1.90 |
| May | 4.25-5.00 | 2.60-2.80 | 3.25-4.00 | 2.20-2.50 | 2.75-3.25 | 2.00-2.20 | 2.25-2.75 | 1.90-2.00 | 2.00-2.25 | 1.70-1.90 |
| June | 4.25-5.00 | 2.60-2.80 | 3.25-4.00 | 2.20-2.40 | 2.75-3.25 | 2.00-2.20 | 2.25-2.75 | 1.80-2.00 | 2.00-2.25 | 1.60-1.75 |
| July | 4.00-5.00 | 2.60-2.80 | 3.25-4.00 | 2.20-2.40 | 2.75-3.25 | 1.90-2.20 | 2.25-2.75 | 1.75-1.90 | 2.00-2.25 | 1.60-1.75 |
| August | 4.00-5.00 | 2.75-3.25 | 3.25-4.00 | 2.35-2.70 | 2.75-3.25 | 2.00-2.30 | 2.25-2.75 | 1.75-1.90 | 2.00-2.25 | 1.55-1.70 |
| September | 4.00-5.00 | 2.70-3.15 | 3.25-3.75 | 2.20-2.60 | 2.50-3.00 | 1.95-2.20 | 2.25-2.50 | 1.70-1.80 | 2.00-2.25 | 1.55-1.70 |
| October | 4.00-5.00 | 2.75-3.25 | 3.25-4.00 | 2.25-2.75 | 2.60-3.00 | 1.90-2.10 | 2.30-2.60 | 1.70-1.80 | 2.10-2.30 | 1.55-1.65 |
| November | 4.00-5.50 | 2.75-3.25 | 3.25-4.00 | 2.25-2.75 | 2.60-3.00 | 1.90-2.20 | 2.30-2.60 | 1.70-1.80 | 2.10-2.30 | 1.55-1.65 |
| December | 4.00-5.50 | 2.75-3.25 | 3.25-4.00 | 2.25-2.75 | 2.60-3.00 | 1.90-2.20 | 2.30-2.60 | 1.70-1.80 | 2.10-2.30 | 1.55-1.70 |

# Research in Molecular Biology

The Molecular Biology Department was created from the Biochemistry and Microbiology Departments six years ago. Since that time the department has emerged as one of the strongest research and teaching departments at the University of Wyoming.

The Molecular Biology Department offers a single degree with four options in order to provide a tailored curriculum for our students. The four options are: microbiology, biochemistry, biotechnology and pre-professional. Any of the first three options can be used as a vehicle to a job following graduation. These jobs are at hospitals, pharmaceutical and biotechnology companies and universities. These options can also be used as a stepping stone to graduate school. Graduates are highly successful in obtaining entrance to the best schools in the country. The pre-professional option is designed to give students the background necessary for gaining entrance into medical, dental, optometry and veterinary schools. The success rate of Molecular Biology majors in acceptance to these schools is one of the highest on campus. Another unique aspect of the Molecular Biology curriculum is the emphasis on students gaining actual laboratory research experience. The department currently has over 110 majors and nearly all of these students participate in this program prior to graduation. This enables students to see what they have learned put into action and to have the thrill of being at the forefront of new knowledge.

The research effort, as measured by external grant dollars, has grown by more than 50% in the past five years despite the significantly lower number of grants being awarded by most funding agencies. The department has over $1.7 million in funding from outside agencies. Each individual researcher has to obtain the funds necessary to carry out their research effort from outside agencies. These agencies are a very diverse group including the: National Science Foundation, National Institutes of Health, Office of Naval Research, Office of Army Research, Environmental Protection Agency, U.S. Department of Agriculture, American Heart Association and American Cancer Society. The research efforts range from a single faculty member working alone to groups as large as fifteen people including technicians, graduate and undergraduate students and postdoctoral fellows.

The Molecular Biology Department has purposefully maintained a very broad spectrum of research interests to insure a complete program for our students and to promote interactions among the faculty. The result is research being done on such diverse organisms as fruit flies, snakes, plants, yeast, spiders, mice, pigs, bacteria of many kinds and humans. The research topics are as diverse as the organisms being used. A sampling of the research being done is described below.

Certain bacteria produce a toxin which will kill the larvae of some insects without affecting any other organisms. Unfortunately the bacteria produce toxins that kill only a narrow class of insects. Lee Bulla's laboratory has combined the toxins from two different bacteria by genetic engineering to produce a toxin which will kill both types of insects killed by the different toxins. The goal is to produce a toxin which can kill all of the classes of insects these toxins will work against. This would allow gardeners and farmers to use just one type of pesticide to kill most insect pests and use one which is environmentally safe as well.

One of the major problems with sugar beet growing in Wyoming is the infection of the plants with curly top virus. As yet it has not been possible to breed resistance to this virus into the plants. Jerry Johnson's laboratory is developing methods to genetically alter the plants to resist this infection by inserting a piece of the DNA from the virus into the DNA of the plant. This extra DNA would prevent the virus

from being able to reproduce in the plant and thus stop the infection. His group has already shown this will work with a virus that infects tobacco and tomato plants.

Although numerous new methods have been developed to treat cancer, none have proven highly successful in many cancer types. One approach would be to tailor the treatment to the individual's specific cancer cells. The way to do this would be to use antibodies to target the killing substances to only the cancer cells. This technique has been tried and shown to work but not well enough. Clare Villemez and his group have developed a new cell killing protein from diphtheria toxin which may greatly enhance this method. The new toxin has the portion deleted which can cause the toxin to kill cells other than the target cells. If the method, which shows promise in cancer cells in tissue culture, works in live animals it will provide a significant advance in our ability to combat this major killer.

It is an interesting phenomena that in both humans and animals fertility is a problem both because of an inability to conceive or conception when it is not wanted. Both of these are linked to key hormones produced by the female which control the fertility cycle and the pregnancy. Tae Ji's laboratory is studying the proteins on and in the cells which respond to these hormones and signal the cell that the hormone is present. They have been able to clone the proteins and get cells in culture to produce them. This will allow detailed study of how they work. This understanding could lead to both increased fertility when it is desired and no fertility when that is needed.

Spider silk is one of the strongest elastic materials known and large scale production would create many unique new products. Unfortunately it is impractical to set up spider farms to produce. Randy Lewis and his group are developing an alternative approach by genetically engineering bacteria to produce the proteins which make spider silk. Products which could be developed include sutures, artificial ligaments and tendons, ropes, composite materials and clothing.

Although virtually unknown in this country human parasites are one of the major human health problems in many countries. Pam Langer's and John Cordingley's laboratories are studying two different parasitic diseases, leishmania and schistosomiasis. These parasites live in other hosts until infecting humans and one of the keys to their life cycle is the changes they undergo in order to successfully infect people. The goal of these studies is to develop vaccines which would protect people on a permanent basis against these parasites.

Groundwater contamination is a serious problem now and will become much more so in the future. Methods to clean up contaminated groundwater are either non-existent or prohibitively expensive. An alternative being explored by Patricia Colberg is to use bacteria to decontaminate the water in the ground. There are a number of factors that must be studied including finding bacteria which can safely degrade different contaminants, the requirements for these bacteria to grow and how well the bacteria can spread through the aquifer to decontaminate large areas. If successful this approach is likely to become the most useful method for large scale decontamination of groundwater.

As these and the other projects not described show, the Molecular Biology Department is involved in research which will eventually affect the lives of many people both in Wyoming and around the world. By providing an enlightening, challenging and stimulating education to our students we can provide the next generation of researchers, health care professionals and technical staff to continue this effort to improve the lives of people.

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# Wyoming State Veterinary Laboratory: An Overview

The Wyoming State Veterinary Laboratory (WSVL) is a professional service laboratory operated by the Department of Veterinary Sciences, College of Agriculture. The diagnostic laboratory was operated by the Wyoming Livestock Board from 1947-1978 and then transferred to UW by legislative action. In 1989 the WSVL was accredited by the American Association of Veterinary Laboratory Diagnosticians. By statute, WSVL serves as Wyoming's animal disease diagnostic laboratory.

Demand for animal disease diagnostic services has increased dramatically in the past decade. The number of cases has nearly doubled and the number of examinations has increased 450%. Approximately 80,000 tests are run annually to determine the presence of disease-causing agents. Both infectious and non-infectious causes of disease are determined. The addition of a toxicology laboratory in 1987 has greatly increased the ability of WSVL to determine many non-infectious disease agents.

All people of Wyoming are served by WSVL. At present, cases involving dogs and cats constitute approximately 40% of the case load, with cattle (21%), wildlife (15%), horses (9%), sheep (4%) and miscellaneous (11%) involved in the balance. Approximately 10% of the cases involve public health issues, most notably rabies, plague, and tularemia. For example, in 1990, there were 1009 animals tested for rabies and 54 were found to be rabid. Many of these cases involved human exposure.

Because of its location, most cases submitted to the "state vet lab" involve tissues or blood from animals that are mailed from veterinary practitioners. With recent advances in veterinary medicine, many of these submissions involve tissue biopsies to determine if a tumor is present and whether it is benign or malignant. Hundreds of family pets and horses in Wyoming are alive today because of early detection of cancerous growths.

Routine blood tests help insure the health of Wyoming's livestock and allow for free movement to other states and nations. For example, Wyoming's cattle herds are free of brucellosis, in part, because of the cooperative State-Federal Veterinary Services laboratory at WSVL. This cooperative laboratory between the USDA and WSVL is just one example of cooperative ventures at the laboratory to reduce costs and insure efficiency.

University of Wyoming diagnostic personnel also work closely with the Wyoming Game and Fish Department to diagnose wildlife disease problems and insure the health of game and nongame species. For example, early recovery efforts and research into vaccines for the black-footed ferrets were conducted at WSVL. Cooperative research efforts with the USDA's bluetongue disease research unit are in place. Also, many analytical services are provided by the Wyoming Department of Agriculture's Chemical and Bacteriological Laboratory that is housed in the same building. Cooperative efforts are a way of life between these various public entities.

Faculty and staff in the Department of Veterinary Sciences also conduct research at WSVL. In 1990 the Wyoming State Veterinary Lab continued ongoing research on such topics as:

1) Chronic Wasting Disease- This infection, prevalent in elk and mule deer, causes brain damage and leads to unusual behavior and loss of weight. The disease is similar to "mad cow disease" (bovine spongiform encephalopathy) in bovines and scrapie in sheep and goats. Studies in this area

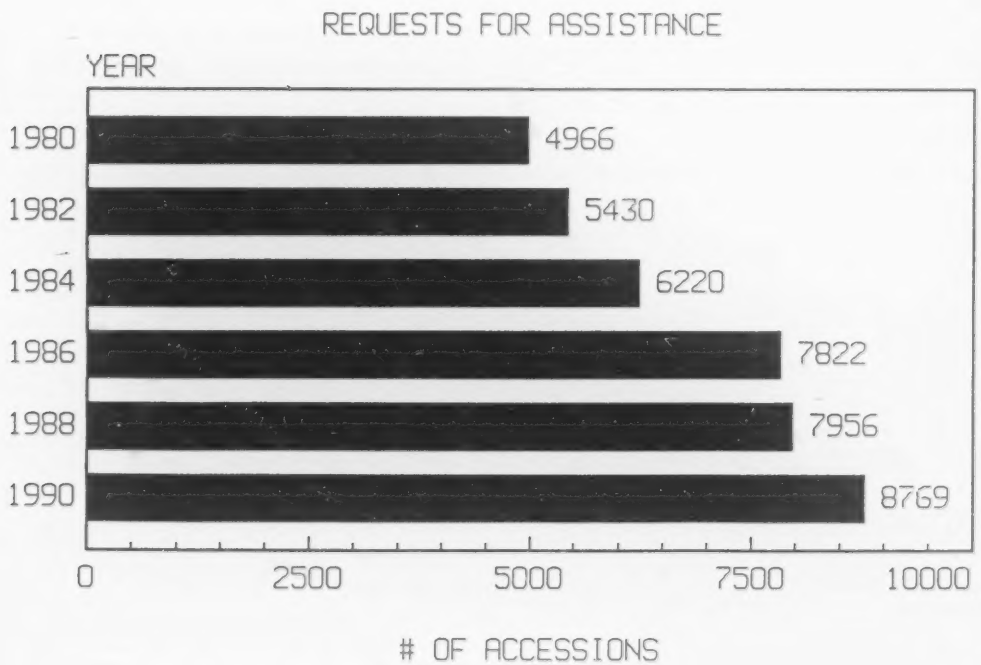
may help to understand the connection, if any, between the infection in wild animals and similar virus in livestock.

2) Leptospirosis- Leptospirosis causes abortions and illness in cattle. Since antelope often share the same rangeland as cattle, experiments were undertaken to analyze the potential for transmission of the disease between wildlife and livestock. Researchers discovered that, while antelope are susceptible to leptospirosis, the type that occurs in pronghorns is not the type that causes problems in cattle.

3) Blue-tongue- This virus (BTV) causes fever and lesions in the mouth, intestinal tract, and other organs. While sheep show outward physical symptoms of the disease, cows do not. A recently obtained research grant is aimed at comparing the differences in how BTV affects sheep and cattle.

While most research is aimed toward understanding and preventing diseases in livestock, improved diagnostic tests are also being developed to aid producers and pet owners.

Lynn Woodard
Director
Wyoming State Veterinary Lab



# Report on the $Co_2$ Huff-n-Puff Project

The following accomplishments are the combined work of the Enhanced Oil Recovery Institute (EORI) and Western Research Institute (WRI) researchers. The EORI portion is funded by the Science, Technology and Energy Authority (STEA) and State of Wyoming appropriations. The WRI portion is funded by the U.S. Department of Energy through the jointly sponsored research (JSR) program at WRI. The STEA and state funds have been used to produce $570,324 of JSR funding for the first year and a proposed $802,785 for the second year.

### Synopsis of Huff-n-Puff Process

The $CO_2$ Huff-n-Puff process is proposed for use in Wyoming by majors and independents in small-acreage patterns which are not amenable to full-scale $CO_2$ miscible flooding. The process typically involves very rapid injection of a maximum of 0.2 MMscf $CO_2$ per foot of pay. At reservoir conditions, this volume results in a maximum invaded distance of a few hundred feet from the wellbore. The injection cycle is followed by a soak cycle of a week or longer. After soaking, the well is placed on production that may last several months. Effective $CO_2$ utilization is 1-2 Mscf $CO_2$ per incremental STB of oil recovered. Additional complete cycles (usually up to a maximum of 3) will continue to recover oil, albeit at lower amounts.

### Summary of Progress

Following is a brief overview of the overall technical accomplishments to date. A total of four single well chemical tracer (SWCT) tests have been completed with a fifth test presently underway. The SWCT tests determine the reservoir performance, flow characteristics, and residual oil saturation. The modeling analysis of the first four SWCT test results is completed. From the analysis, several reservoir problems have been identified. These problems include zonal crossflow, Figure 1, and reservoir drift, Figure 2. Both flow situations are detrimental to $CO_2$ cyclic stimulation.

For the STEA and state program, the first cycle of $CO_2$ cyclic stimulation has been conducted on four wells and a second cycle has been completed on a fifth well. Two of the four first-cycle stimulations and the second-cycle stimulation have been completed. The remaining two first-cycle stimulations are on production. The injection and production cycles of several nonprogram wells (18 wells) have been or are presently being monitored to increase the comprehensiveness of the program.

Over 1000 gas and 800 fluid samples have been taken from the 23 program and nonprogram field tests of $CO_2$ Huff-n-Puff. All sample collection and analysis has been conducted by WRI. Routine gas analysis has been performed on 970 of the gas samples. Oil-water separation has been completed on approximately 750 of the fluid samples with further analysis on approximately 125 of these samples. Figure 3 shows the location of the program and nonprogram wells which have been or are being sampled and analyzed.

The collected samples represent 15 fields in four of the major producing basins of Wyoming. Five of the fields are part of the STEA-state program, the remaining fields are being sampled and analyzed to provide a more comprehensive analysis of the $CO_2$ Huff-n-Puff process.

Development of phase-equilibrium relationships for the $CO_2$ cyclic stimulation process is progressing with the detailed analysis of the two specially collected oil samples nearing completion. The data produced from the analyses are being used to develop phase-equilibrium relationships for incorporation into the process model. Several potential numerical models for the process have been evaluated and

a compositional model has been selected as the basis of the process model. The model is now functioning on a UW computer system and modification of the computer code to incorporate the necessary process functions for the cyclic stimulation is continuing.

**Accomplishments This Quarter**

The preparations for two more first-cycle stimulations for program wells were made. The two candidate wells are a Chevron U.S.A., Inc. well in the Steamboat Butte field and a Koch Production Ltd. well in the Bonanza field. Both wells will be evaluated by single-well chemical tracer testing prior to $CO_2$ injection to insure that the wells are amenable to the process. The tracer testing of the Chevron well has been initiated. The sizing of the $CO_2$ slug for the Chevron well has been completed and a bid for the injection of the slug was accepted.

The sampling of ongoing field tests and the analysis of collected samples has continued. The phase-equilibrium relationships development and the numerical modeling tasks have also been progressing.

The proposal for the U.S. DOE second year funding of the project was developed and submitted for approval to the U.S. DOE by WRI. Receipt of the funding approval is expected early next quarter.

The technical progress of the $CO_2$ Huff-n-Puff program was presented at the 6th Wyoming Enhanced Oil Recovery Symposium conducted by the University of Wyoming Enhanced Oil Recovery Institute. Presentations at the symposium covered the field studies, the phase-equilibrium studies, and the numerical modeling efforts.

**Projected Achievements Next Quarter**

Following is a listing of the tasks which will be addressed:

- Completion of the single well chemical tracer tests at the Steamboat Butte and Bonanza fields, if appropriate.
- Completion of the injection phase and initiation of the production phase for the first cycle at wells in the Steamboat Butte and Bonanza fields.
- Continue sample collection and analysis of active program and nonprogram single well injection-production tests.
- Continue the development of the phase equilibrium relationships.
- Continue the development of the numerical simulator. Begin history matching of field results.

Lyle A. Johnson Jr.
Senior Staff Research Engineer
Western Research Institute

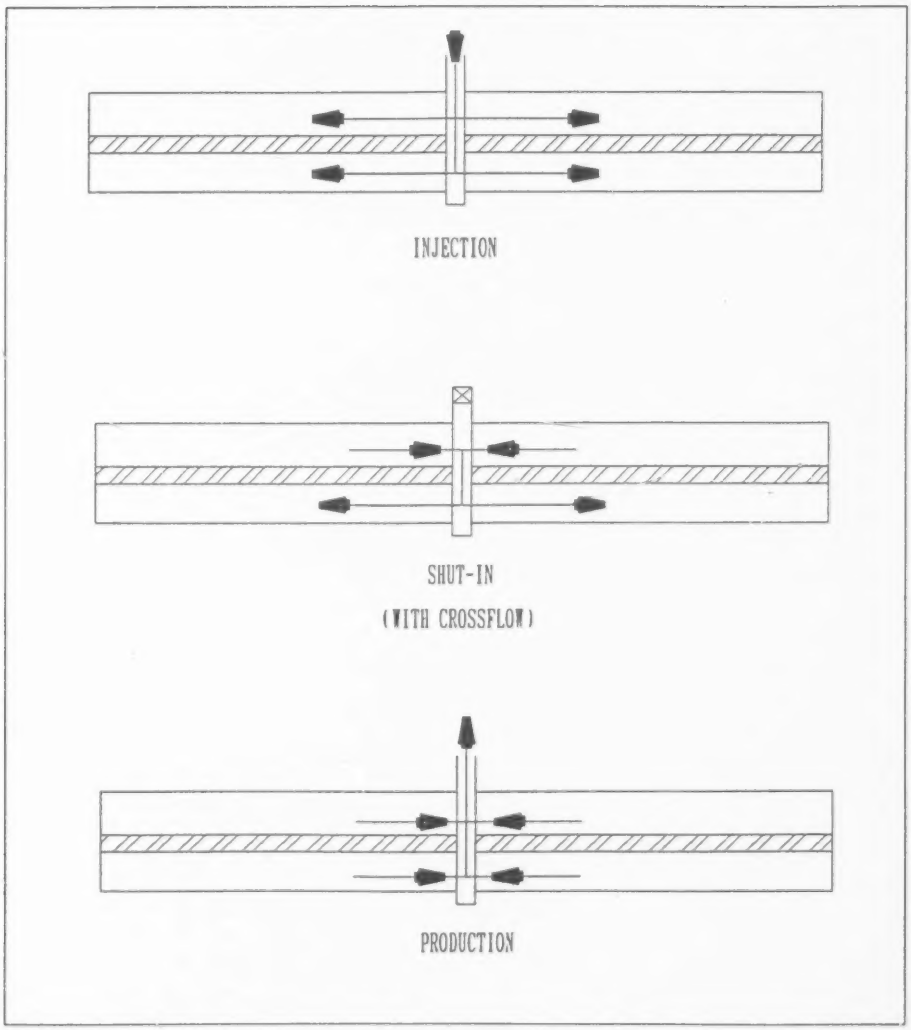



Figure 1. Cross-Flow Schematic

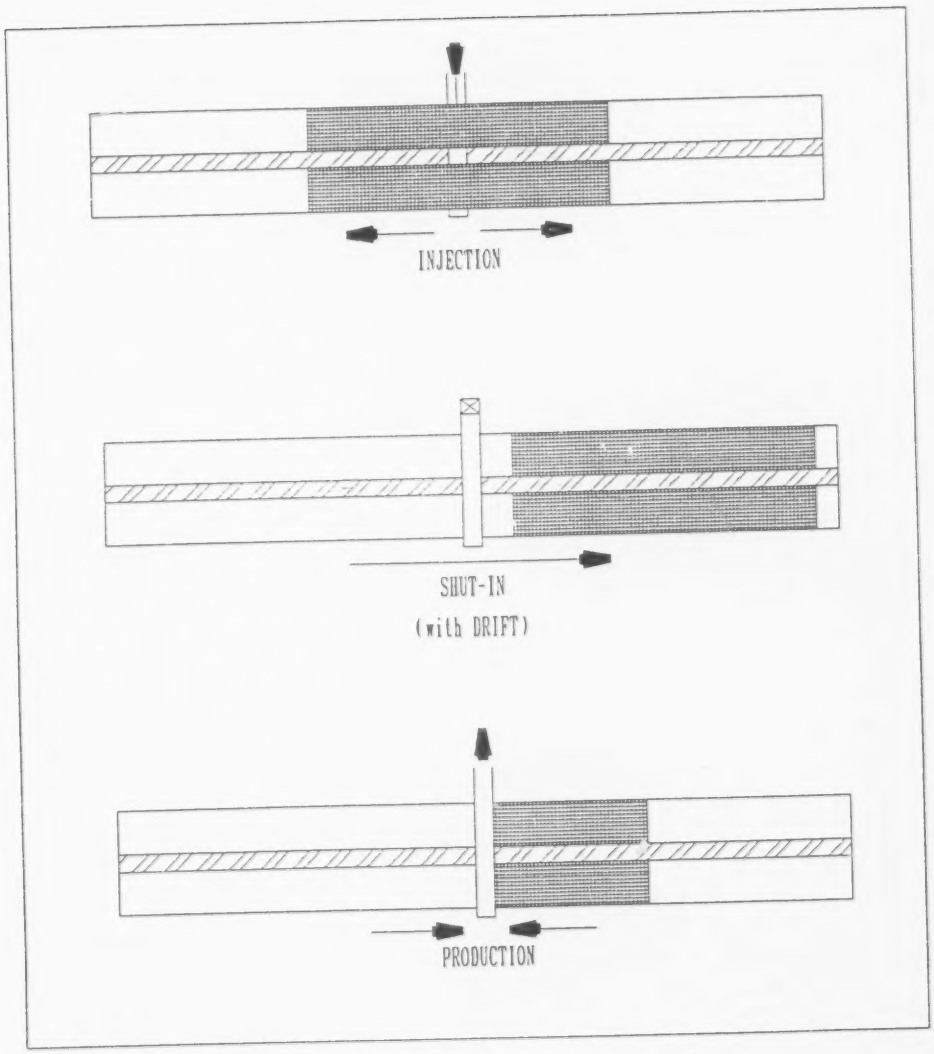
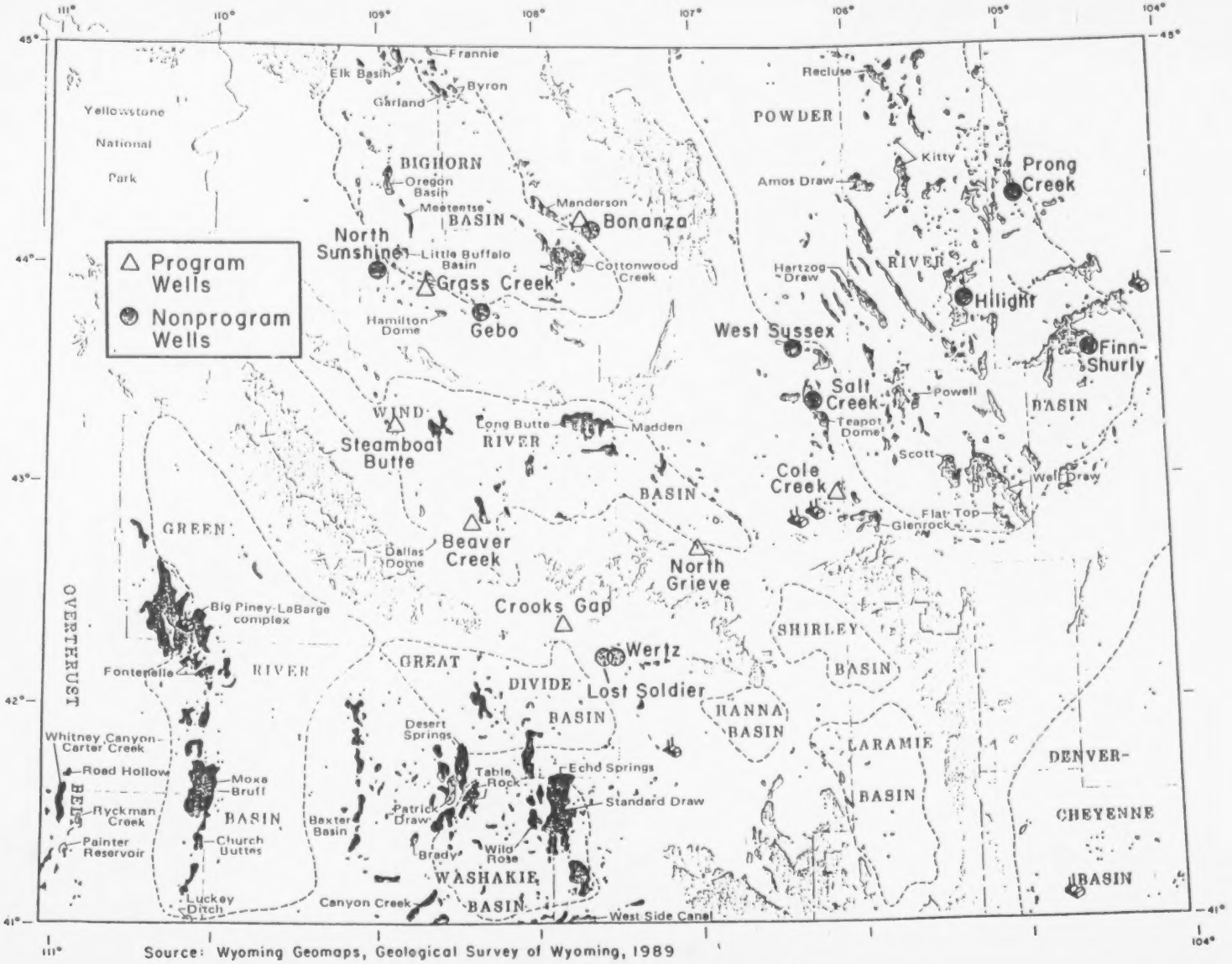



Figure 2. Drift Schematic




Source: Wyoming Geomaps, Geological Survey of Wyoming, 1989

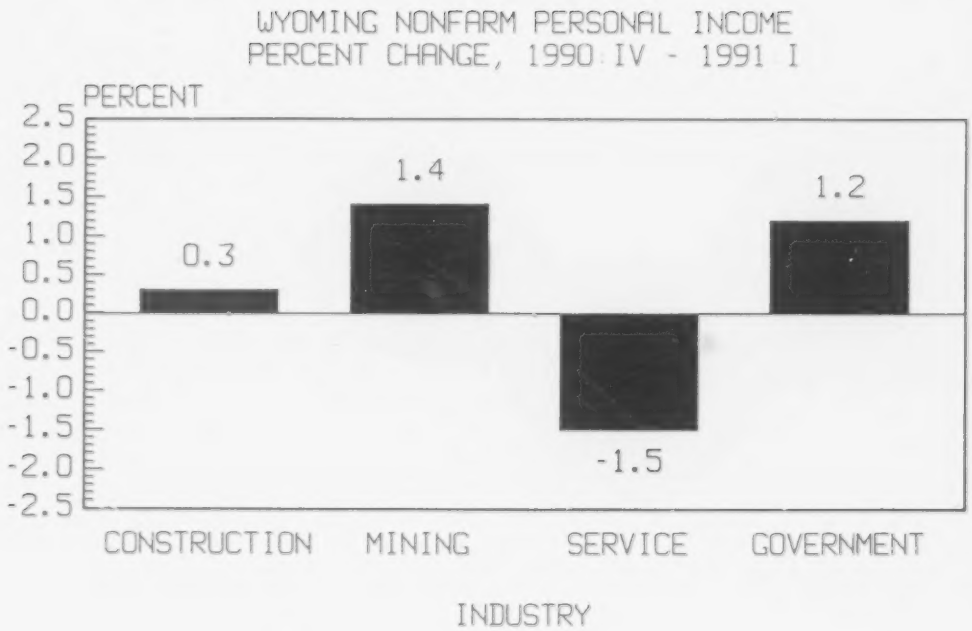
Figure 3. $CO_2$ Cyclic Stimulation Well Locations

# FYI

## Physicians, Rate per 100,000 Population, 1988

| Division and State | Rate | Rank |
|---|---|---|
| United States | 210 | -- |
| New England | 280 | -- |
| Maine | 173 | 29 |
| New Hampshire | 186 | 23 |
| Vermont | 244 | 5 |
| Massachusetts | 322 | 2 |
| Rhode Island | 244 | 5 |
| Connecticut | 293 | 4 |
| Middle Atlantic | 267 | -- |
| New York | 307 | 3 |
| New Jersey | 234 | 8 |
| Pennsylvania | 227 | 9 |
| East North Central | 187 | -- |
| Ohio | 191 | 18 |
| Indiana | 151 | 40 |
| Illinois | 210 | 12 |
| Michigan | 180 | 26 |
| Wisconsin | 181 | 25 |
| West North Central | 180 | -- |
| Minnesota | 212 | 11 |
| Iowa | 145 | 43 |
| Missouri | 190 | 21 |
| North Dakota | 167 | 34 |
| South Dakota | 138 | 46 |
| Nebraska | 168 | 33 |
| Kansas | 169 | 31 |
| South Atlantic | 207 | -- |
| Delaware | 191 | 18 |
| Maryland | 325 | 1 |
| Dist. of Columbia | 591 | -- |
| Virginia | 204 | 14 |
| West Virginia | 164 | 36 |
| North Carolina | 179 | 27 |
| South Carolina | 156 | 39 |
| Georgia | 167 | 34 |
| Florida | 203 | 15 |
| East South Central | 160 | -- |
| Kentucky | 161 | 37 |
| Tennessee | 187 | 22 |
| Alabama | 151 | 40 |
| Mississippi | 125 | 49 |
| West South Central | 166 | -- |
| Arkansas | 144 | 45 |
| Louisiana | 184 | 24 |
| Oklahoma | 145 | 43 |
| Texas | 169 | 31 |
| Mountain | 177 | -- |
| Montana | 150 | 42 |
| Idaho | 120 | 50 |
| ***Wyoming*** | ***134*** | ***48*** |
| Colorado | 202 | 16 |
| New Mexico | 173 | 29 |
| Arizona | 191 | 18 |
| Utah | 177 | 28 |
| Nevada | 158 | 38 |
| Pacific | 232 | -- |
| Washington | 206 | 13 |
| Oregon | 196 | 17 |
| California | 242 | 7 |
| Alaska | 138 | 46 |
| Hawaii | 225 | 10 |

# Economic Changes

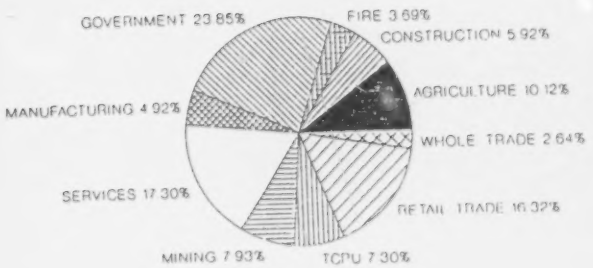



SOURCE BUREAU OF ECONOMIC ANALYSIS

## ECONOMIC CHANGES

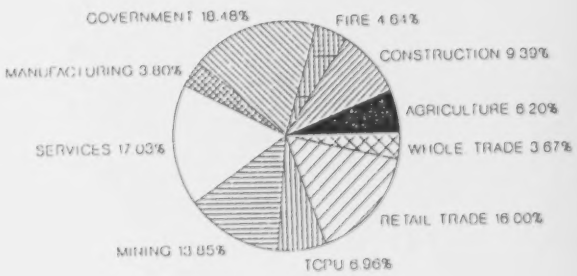
Graphs on this page represent the relative size of employment in Wyoming by sector. The information is taken from the Wyoming Economic Forecast Report released by the Department of Administration and Information, Division of Economic Analysis. F.I.R.E. stands for finance, insurance, and real estate; TCPU represents transportation, communication, and public utilities. Note that, while shifting positions slightly, Government, Service, and Retail Trade have been, and should remain, the top 3 employment sectors in Wyoming.

EMPLOYMENT BY SECTOR
1970



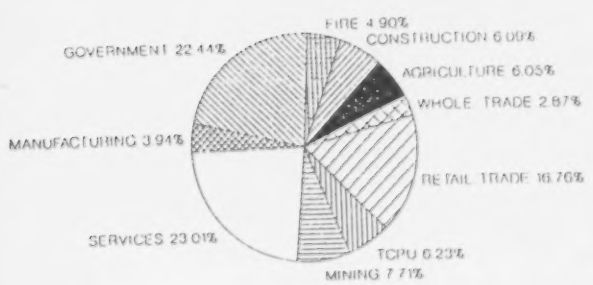

Actual Data

EMPLOYMENT BY SECTOR
1980



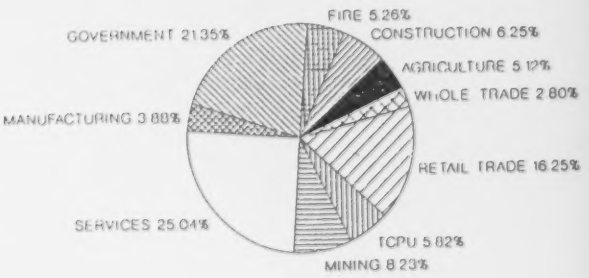

Actual Data

EMPLOYMENT BY SECTOR
1990




Forecasted

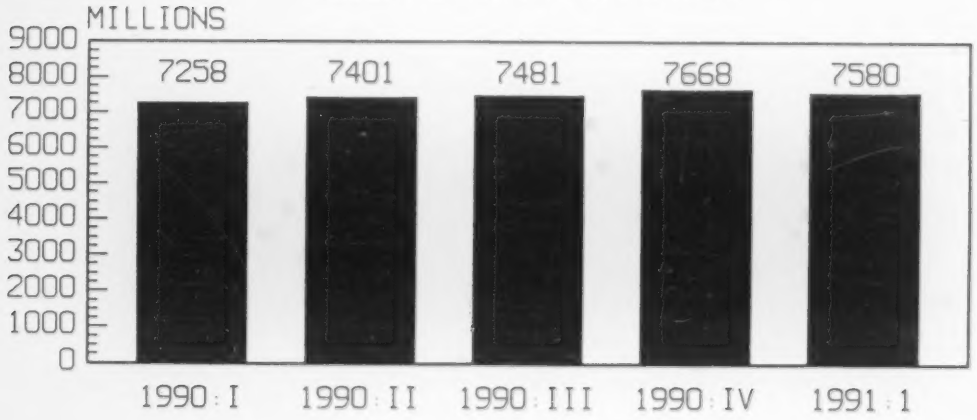
EMPLOYMENT BY SECTOR
2000




Forecasted

# State Data

WYOMING TOTAL PERSONAL INCOME
1990:I - 1991:I
(MILLIONS OF DOLLARS, SEASONALLY
ADJUSTED AT ANNUAL RATES)




SOURCE: BUREAU OF ECONOMIC ANALYSIS

Table 1: Agriculture[1]

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Timber Cut in Wyoming National Forests (MBF) | 39416. | 54863. | 23488. | 6218. | 37522. | 46222. | 26418. | 65442. | 31445. | 43993. | 26199. | 7141. |
| Price Indices[2] (1967=100) | | | | | | | | | | | | |
| 2. Wyoming Crops, Prices Received-Latest | 323. | 322. | 349. | 363. | 313. | 336. | 349. | 362. | 263. | 271. | 276. | 279. |
| 3. Wyoming Crops, Prices Received-Average | 302. | 323. | 344. | 362. | 336. | 329. | 349. | 350. | 313. | 273. | 272. | 275. |
| 4. U.S. Crops, Prices Received-Latest | 260. | 262. | 266. | 275. | 243. | 244. | 248. | 250. | 236. | 234. | 243. | 282. |
| 5. U.S. Crops, Prices Received-Average | 262. | 260. | 264. | 273. | 251. | 245. | 268. | 253. | 243. | 234. | 255. | 266. |
| 6. Wyoming, All Commodities, Prices Received-Latest | 313. | 292. | 324. | 301. | 310. | 298. | 320. | 302. | 301. | 291. | 307. | 303. |
| 7. Wyoming, All Commodities, Prices Received-Average | 295. | 300. | 311. | 308. | 311. | 299. | 316. | 311. | 303. | 295. | 292. | 309. |
| 8. U.S. All Commodities, Prices Received-Latest | 264. | 265. | 274. | 270. | 262. | 272. | 274. | 278. | 271. | 264. | 270. | 283. |
| 9. U.S., All Commodities, Prices Received-Average | 263. | 263. | 275. | 271. | 265. | 269. | 277. | 278. | 274. | 266. | 266. | 278. |
| 10. Wyoming Livestock, Prices Received-Latest | 310. | 283. | 316. | 283. | 300. | 286. | 311. | 284. | 313. | 297. | 316. | 310. |
| 11. Wyoming Livestock, Prices Received-Average | 293. | 293. | 309. | 292. | 303. | 289. | 306. | 299. | 300. | 301. | 297. | 319. |
| 12. U.S. Livestock, Prices Received-Latest | 268. | 269. | 281. | 264. | 279. | 297. | 299. | 303. | 303. | 291. | 296. | 285. |
| 13. U.S. Livestock, Prices Received-Average | 264. | 267. | 284. | 269. | 278. | 290. | 285. | 301. | 302. | 294. | 274. | 289. |
| 14. Prices Paid by U.S. Farmers-Average | 352. | 354. | 359. | 361. | 361. | 365. | 281. | 372. | 380. | 381. | 384. | INA |

[1]First time readers of WQU should refer to the "Format" page (in back) for an explanation of abbreviations and table formats.
[2]The index for the last month (latest) of each quarter, along with the average of the three monthly indices of each quarter.

Sources: Series 1: United States Forest Service. "Timber Cut and Sold, Convertible Products." Region 2 and 4 reports published quarterly.
Series 2-15: Wyoming Crop and Livestock Reporting Service. Bi-weekly Ag Statistics.

Table 2: Banking and Finance

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total Bank Loans and Leases Financing Receivables (T$) | 1777474 | 1758410 | 1740029 | 1793438 | 1787592 | 1782338 | 1848557 | 1944633 | 1990127 | 2069101 | 2025762 | 2116136 |
| 2. Total Bank Deposits (T$) | 3712403 | 3753325 | 3623495 | 3621158 | 3633097 | 3838374 | 3768344 | 3864849 | 4018391 | 4129695 | 4029863 | 4062770 |
| 3. Total Non-Interest-Bearing Deposits (T$) | 572367 | 577610 | 525702 | 549281 | 559276 | 648397 | 542168 | 555941 | 585554 | 625165 | 3466704 | 582430 |
| 4. Savings and Loan Mortgage Loans (T$)[1] | 726300 | 711602 | 719240 | 696415 | 617166 | 636718 | 431583 | 418552 | 354447 | 330883 | 322966 | 335025 |
| 5. Savings and Loan Deposits (T$) | 1107961 | 1070072 | 1032814 | 988180 | 952120 | 962666 | 945644 | 908386 | 767458 | 708655 | 694312 | 693689 |
| 6. Prime Interest Rate[2] | 10.00 | 10.50 | 11.50 | 11.07 | 10.50 | 10.50 | 10.0 | 10.0 | 10.0 | 10.0 | 9.00 | 8.5 |

[1]Only members of the Federal Home Loan Bank Board are included. Indicates amount at the end of the quarter.
[2]Prime rate charged by banks on short-term business loans. Rate is for last month of the quarter.

Sources: Series 1-3: Office of the State Examiner of Wyoming, Abstract Report of State and National Banks in Wyoming, published quarterly.
Series 4 and 5: Federal Home Bank of Seattle, Monthly Report. Comparative statistical analysis of member institutions.
Series 6: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 3: Business Conditions

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Domestic Corporations | 246 | 221 | 284 | 302 | 236 | 276 | 316 | 355 | 353 | 365 | 398 | 424 |
| 2. New Foreign Corporations | 208 | 232 | 218 | 249 | 196 | 208 | 196 | 262 | 214 | 231 | 201 | 201 |
| 3. Total New Corporations | 454 | 453 | 502 | 551 | 432 | 484 | 512 | 617 | 567 | 596 | 599 | 625 |
| 4. Business Failures | 34 | 32 | 31 | 30 | 24 | 25 | 31 | 28 | 19 | INA | INA | INA |
| 5. Value of Business Failures ($) | 28339514 | 36551338 | 3120102 | 7852143 | 3591064 | 1998791 | 2914000 | 5578685 | 2072828 | INA | INA | INA |
| 6. Personal Bankruptcies | 306 | 306 | 274 | 336 | 287 | 285 | 237 | 362 | 252 | INA | INA | INA |

Sources: Series 1-3: Secretary of State. New and Foreign Corporations. Monthly report.
Series 4-6: Cheyenne Credit Bureau. Wyoming bankruptcy cases, business failures, and value of failures. Weekly publication.

Table 4: Construction

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Residential Dwelling Units | 359 | 291 | 233 | 289 | 401 | 264 | 394 | 533 | 614 | 463 | 412 | 943 |
| 2. Value of Residential Dwellings Constructed (M$) | 31.3 | 22.6 | 18.2 | 25.0 | 34.7 | 23.8 | 34.7 | 51.1 | 54.8 | 43.9 | 36.4 | 81.4 |
| 3. Value of Nonresidential Construction (M$) | 6.9 | 10.2 | 10.9 | 17.1 | 23.6 | 34.6 | 15.5 | 26.3 | 30.2 | 21.0 | 17.9 | 45.6 |
| 4. Building Permits Issued in Selected Wyoming Cities | 2220 | 2082 | 1578 | 2806 | 2663 | 1996 | 1695 | 2634 | 2558 | 1885 | 1652 | 2710 |
| 5. Value of Authorized Construction (T$) | 21878 | 18071 | 8866 | 24528 | 22760 | 27343 | 16011 | 37542 | 29331 | 20714 | 24818 | 32449 |
| 6. Mortgage Interest Rate[1] | 8.90 | 9.03 | 9.66 | 10.09 | 9.87 | 9.70 | 9.70 | 9.80 | 9.60 | 9.61 | 9.16 | 9.18 |

[1]Conventional first mortgage for new home purchase. U.S. average for last month of quarter.

Sources: Series 1-3: F.W. Dodge Division of McGraw-Hill. "Dodge Local Construction Potentials." Published monthly.
Series 4-5: Survey Research Center. "Local Construction Reports." Survey of authorized construction in selected cities conducted monthly.
Series 6: U.S. Department of Comerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.

Table 5: Consumers

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. New Truck Registrations | 3203 | 3227 | 3086 | 3734 | 3775 | 3344 | 3474 | 3697 | 2986 | 4089 | 2969 | 3050 |
| 2. New Car Registrations | 2969 | 2849 | 2538 | 3341 | 3412 | 2409 | 2352 | 2607 | 2438 | 2919 | 2021 | 2204 |
| 3. Wyoming Personal Income (M$) | 6628 | 6684 | 6802 | 6851 | 6899 | 7058 | 7258 | 7401 | 7481 | 7668 | 7580 | INA |
| 4. U.S. Disposable Income (B$) | 3512 | 3587 | 3690 | 3711 | 3743 | 3800 | 3888 | 3926 | 3951 | 4002 | 4021 | 4058 |
| 5. U.S. Personal Income (M$) | 4095382 | 4175632 | 4284521 | 4344107 | 4384651 | 4456325 | 4562866 | 4625886 | 4685212 | 4732538 | 4747047 | INA |
| 6. Latest U.S. Consumer Price Index (1982-1984 = 100)[1,2] | 118.5 | 119.2 | 120.8 | 122.8 | 123.6 | 124.6 | 127.1 | 128.3 | 131.1 | 132.2 | 133.0 | 134.1 |
| 7. Quarter's Average U.S. CPI | 117.8 | 119.5 | 120.2 | 122.4 | 123.3 | 124.4 | 127.5 | 127.7 | 129.9 | 132.1 | 132.9 | 133.7 |
| 8. Liquor Sales (T$) | 7041 | 8368 | 5530 | 6747 | 7269 | 7746 | 5729 | 7036 | 7916 | 8643 | 6173 | 7565 |

[1]Number shown is for the last month of the quarter. CPI shown is the index for wage earners and clerical workers.

[2]Beginning January 1987, the consumer price index, previously expressed on a base of 1967=100, has been rebased to 1982-1984=100. Selection of the 1982-1984 period was made to coincide with the updated expenditure weights, which are abased upon data tablulated from the Consumer Expenditure Surveys for 1982, 1983, and 1984. Historical data on the new base or additional information regarding these changes is available from the Bureau of Labor Statistics, Washington, D.C. 20212.

Sources: Series 1-2: R.L. Polk and Company Motor Statistical Division. "National New Vehicle Registration Service." Published monthly.
Series 3-4: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published quarterly.
Series 5-7: U.S. Department of Commerce, Bureau of Economic Analysis. Survey of Current Business. Published monthly.
Series 8: Wyoming Liquor Commission. Sales data are reported to SRC.

Table 6: Employment and Labor[1]

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Civilian Labor Force | 235250 | 231426 | 235106 | 238973 | 242749 | 239173 | 241276 | 245354 | 245287 | 243179 | 241223 | 245945 |
| 2. Employment | 222072 | 216552 | 217688 | 224543 | 228035 | 225734 | 226438 | 233190 | 235389 | 230014 | 224834 | 233810 |
| 3. Unemployment | 13178 | 14874 | 17418 | 14431 | 14714 | 13438 | 14838 | 12164 | 9899 | 13166 | 16388 | 12135 |
| 4. Unemployment rate | 5.6 | 6.4 | 7.4 | 6.0 | 6.1 | 5.6 | 6.1 | 5.0 | 4.0 | 5.4 | 6.8 | 4.9 |
| 5. Initial Claims Filed | 5376 | 9704 | 10334 | 6508 | 4621 | 8659 | 9691 | 5673 | 4682 | 8791 | 9745 | 6722 |
| 6. Miners' Average Weekly Hours | 43.4 | 42.7 | 46.3 | 34.8 | 45.2 | 45.2 | 43.9 | 45.1 | 46.2 | 46.5 | 46.4 | 45.5 |
| 7. Miners' Average Weekly Pay ($) | 619.70 | 627.33 | 678.68 | 651.62 | 656.60 | 661.19 | 648.65 | 686.71 | 685.37 | 703.83 | 732.44 | 711.14 |
| 8. Miners' Average Hourly Wage ($) | 14.29 | 14.68 | 14.67 | 18.73 | 14.54 | 14.63 | 14.77 | 15.22 | 14.83 | 15.14 | 15.78 | 15.62 |

[1]The most recent year's data are preliminary.

Sources: Series 1-11: Wyoming Employment Security Commission. Labor Force Trends. Published monthly.

Table 7: Energy and Mineral Production

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Wyoming Coal (TST) | 42883 | 41013 | 41874 | 40928 | 45064 | 43879 | 45110 | 43496 | 47488 | 48131 | 53222 | 34855 |
| 2. U.S. Coal (TST) | 239046 | 227754 | 249267 | 226258 | 257202 | 248741 | 266102 | 247348 | 268296 | 251951 | 260581 | 187058 |
| 3. Wyoming Oil (TBPD) | 306 | 299 | 302 | 299 | 291 | 291 | 286 | 284 | 284 | 284 | 282 | INA |
| 4. U.S. Oil (TBPD) | 8033 | 7984 | 7753 | 7701 | 7529 | 7463 | 7374 | 7119 | 7150 | 7346 | 7424 | INA |
| 5. Wyoming Natural Gas (MMCFD)[1] | 1135 | 1455 | 1953 | 1274 | 1340 | 1820 | 2009 | 1754 | 1824 | 2001 | INA | INA |
| 6. U.S. Natural Gas (MMCFD) | 44547 | 48982 | 51693 | 48980 | 47211 | 49795 | 52982 | 49343 | 47256 | 51385 | 51997 | INA |
| 7. Active Rig Counts in Wyoming--Average | 43 | 31 | 20 | 22 | 43 | 50 | 34 | 31 | 44 | 39 | 28 | 30 |

[1]Beginning with fourth quarter 1986, Wyoming gas includes carbon dioxide production

Sources: Series 1,2,5 and 6: U.S. Department of Energy. Energy Data Reports. Gas data are from Natural Gas Monthly, and the Wyoming Oil and Gas Conversation Commission. Coal data are published weekly.
Series 3-4: The Oil and Gas Journal. U.S. and Wyoming Oil Production. Published weekly.
Series 7: Petroleum Information Corporation, Hughes Tool Company. Monthly Average Active Rig Counts in Wyoming.

Table 8: Government

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sales and Use Tax Collections (T$) | 49721 | 46445 | 41823 | 42966 | 53145 | 54618 | 51699 | 50077 | 61744 | 61387 | 56536 | 53796 |
| 2. Violent Crime[1] | 431 | 308 | 310 | 278 | 323 | 307 | 301 | 335 | 376 | 322 | INA | INA |
| 3. Nonviolent Crime[2] | 4662 | 3917 | 3565 | 4423 | 4704 | 4138 | 3800 | 4432 | 5000 | 4055 | INA | INA |
| 4. Stolen Property (T$) | 2467 | 2272 | 2040 | 2617 | 2200 | 1894 | 2151 | 2269 | 2297 | 2223 | INA | INA |
| 5. Stolen Property Recovery Rate | 35.5 | 36.0 | 42.8 | 30.5 | 44.0 | 36.7 | 46.3 | 38.6 | 43.3 | 43.5 | INA | INA |
| 6. Percent of Crimes Cleared[3] | 30.9 | 40.0 | 33.0 | 27.5 | 27.1 | 29.5 | 35.2 | 28.6 | 27.7 | 30.6 | INA | INA |

[1]Murder, negligent homicide, forcible rape, robbery, aggravated assault.
[2]Burglary, larceny, auto theft.
[3]Clearance of a crime indicates resolution of a complaint by arrest or other extraordinary means.

Sources: Series 1: Wyoming Department of Revenue and Taxation, Sales and Use Tax Division. "Net Collections by Business Class by County."
Series 2-6: Uniform Crime Reporting Center for Criminal Justice Research, Division of Criminal Identification, Office of the State Attorney General. "Crime in Wyoming." Published quarterly.

Table 9: Tourism

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Visitors, National Parks and Monuments | | | | | | | | | | | | |
| 1. Yellowstone | 1268270 | 216076 | 82542 | 720021 | 1724290 | 153523 | 79552 | 761664 | 1857973 | 139998 | 174149 | 717598 |
| 2. Grand Teton | 1083754 | 223562 | 211180 | 665734 | 1361210 | 302539 | 170799 | 680593 | 1544479 | 284906 | 193905 | 692678 |
| 3. Devil's Tower | 222877 | 20702 | 8064 | 120589 | 229668 | 19106 | 8251 | 119264 | 279985 | 20224 | 9983 | 135349 |
| 4. Fossil Butte | 13838 | 1195 | 224 | 5565 | 13192 | 1452 | 195 | 6692 | 25244 | 2945 | 888 | 6779 |
| 5. Fort Laramie | 49631 | 4145 | 1475 | 20488 | 40697 | 3007 | 1505 | 21869 | 41037 | 2845 | 1666 | 21269 |
| 6. Big Horn NRA-South[1] | 58820 | 35558 | 14293 | 47417 | 62160 | 185172 | 15664 | 102821 | 70249 | 29713 | 26608 | 43883 |
| Other Tourism Indicators | | | | | | | | | | | | |
| 7. Traffic Count (Avg. Number of Vehicles/Day) | 178675 | 118023 | 113409 | 146663 | 184209 | 118130 | 105793 | 159830 | 206100 | 125782 | 112278 | 159210 |
| 8. Hotel, Motel, and Camp Sales Tax (T$) | 2106 | 1929 | 954 | 1013 | 1962 | 1951 | 991 | 1135 | 2731 | 2082 | 1045 | 1154 |
| 9. Gasoline Sales (TGL) | 96106 | 70784 | 61807 | 78869 | INA | INA | INA | INA | INA | INA | INA | INA |

[1]Big Horn Canyon N.R.A. is only partially in Wyoming. Only visitation for the Wyoming part is shown.

Sources: Series 1-6: Monthly visitor use reports of the National Park Service.
Series 7: Traffic Survey Unit-Planning Branch, Wyoming State Highway Department. "Selected Recording Stations Traffic Counter Data." Published monthly.
Series 8: Wyoming Department of Revenue and Taxation. "Sales and Use Tax Summary by County by SIC Major and Minor." Reported monthly.
Series 9: Petroleum Association of Wyoming. Monthly Gasoline Gallonage Report.

Table 10: Utilities[1]

| Calendar Quarters | 3/88 | 4/88 | 1/89 | 2/89 | 3/89 | 4/89 | 1/90 | 2/90 | 3/90 | 4/90 | 1/91 | 2/91 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Residential Electric Connections | 177122 | 176457 | 175841 | 175589 | 175485 | 176197 | 174439 | 179163 | 176520 | 176434 | 176345 | 177059 |
| 2. Residential Electric Consumption (TKWH) | 301098 | 401776 | 688891 | 348577 | 296588 | 418463 | 488454 | 351960 | 304197 | 440211 | 529119 | 366247 |
| 3. Commercial Electric Connections | 33846 | 33756 | 33928 | 33997 | 34038 | 140722 | 34036 | 34278 | 34370 | 34281 | 34353 | 34357 |
| 4. Commercial Electric Consumption (TKWH) | 425495 | 426766 | 467697 | 414902 | 428705 | 449339 | 457875 | 447084 | 469100 | 469265 | 498454 | 486921 |
| 5. Industrial Electric Connections | 2921 | 2872 | 2972 | 3104 | 3143 | 3084 | 3203 | 3507 | 3535 | 3431 | 2909 | 3525 |
| 6. Industrial Electric Consumption (TKWH) | 1720051 | 1847617 | 1812799 | 1923513 | 1790624 | 1968557 | 1990072 | 1919833 | 1796303 | 2131555 | 1885977 | 1877502 |
| 7. Other Connections[2] | 3899 | 3404 | 3349 | 7440 | 4573 | 4091 | 4675 | 4198 | 4280 | 3908 | 3790 | 3975 |
| 8. Other Consumption (TKWH) | 64994 | 13221 | 9051 | 41364 | 102572 | 59012 | 57146 | 57187 | 94327 | 59782 | 136109 | 52619 |
| 9. Residential Natural Gas Connections | 90673[3] | 93300 | 100074 | 99535 | 97665 | 90066 | 90456 | 90223 | 89853 | 90327 | 90234 | 89847 |
| 10. Residential Natural Gas Consumption (MCF) | 826220[3] | 2521850 | 5786697 | 2436947 | 871763 | 2454142 | 4537105 | 2321660 | 760692 | 10731338 | 7052337 | 4679634 |
| 11. Commercial Natural Gas Connections | 8357[3] | 9398 | 9422 | 9289 | 10514 | 18913 | 19028 | 18910 | 18928 | 18746 | 19588 | 19885 |
| 12. Commercial Natural Gas Consumption (MCF) | 475106[3] | 1349515 | 2981071 | 1283967 | 631348 | 1818451 | 3305106 | 1702262 | 614511 | 7950861 | 5410448 | 3497581 |
| 13. Industrial Natural Gas Connections | 90 | 78 | 85 | 82 | 80 | 79 | 73 | 73 | 71 | 68 | 63 | 56 |
| 14. Industrial Natural Gas Consumption (MCF) | 2324709 | 2504087 | 3069267 | 1977830 | 2279086 | 2611580 | 3019329 | 2774710 | 1810840 | 3361610 | 3127187 | 320934 |
| 15. Other Natural Gas Connections | 35 | 34 | 36 | 36 | 34 | 33 | 29 | 32 | 38 | 37 | 38 | 41 |
| 16. Other Natural Gas Consumption (MCF) | 7488 | 232 | 1216 | 4344 | 10405 | 312 | 138 | 2309 | 1138300[4] | 1384771 | 608554 | 4291413 |

[1]Some small utilities do not report, hence the data are slightly less than actual state totals. The data are consistent. The same utilities' reports are included in each figure.
[2]"Other" includes agriculture, municipal, and other public.
[3]Starting with third quarter, 1988, the figures for Residential and Commercial Natural Gas connections and Residential and Commercial Natural Gas Consumption reflect the merger of Northern Gas Division, Northern Utilities division, and Northern Mountain Gas Company now doing business as Northern Gas of Wyoming.
[4]Starting with third quarter, 1990, Mountain Fuel Supply included gas transported by their company for another company in the "other" category.

## FORMAT

For data available at least quarterly, the last 12 quarters are printed in **WQU**. In this edition, published series begin with the 3rd quarter of 1988, and end with the 2nd quarter of 1991. For other data series (primarily annual, the most recent observations, up to 12, are published in **WQU**. Quarters are calendar quarters. For example, the 4th quarter is composed of October, November and December. In the table headings and narratives, a particular quarter will be indicated by notation such as 4/87 (4th quarter, 1987), 1/88 (1st quarter, 1988), and so on.

Besides each data series name is an abbreviation in parenthesis. The abbreviation indicates the units (such as dollars, tons, feet, miles, etc.) of the data. The key to the units abbreviations is below.

Throughout **WQU**, all data are for the State unless otherwise stated. The most recent year's data should be viewed as preliminary, due to revisions. The acronym "INA" signifies that information is not available.

The reader should be attentive to the footnotes at the bottom of pages, particularly those accompanying a data table. The footnotes help the reader to properly interpret the data, and they also indicate when more detailed (by subject or by area) data than that which is shown is available from SRC. A list of sources follows the footnotes.

Key to Units Abbreviations

| | | | |
|---|---|---|---|
| MBF - | Thousand Board feet | CWT - | Hundred Weight |
| KWH - | Kilowatt Hours | ST - | Short Tons |
| TKWH - | Thousand Kilowatt Hours | HST - | Hundreds of Short Tons |
| $ - | Dollars | TST - | Thousands of Short Tons |
| H$ - | Hundreds of Dollars | $/ST - | Dollars per Short Ton |
| T$ - | Thousands of Dollars | HBBL - | Hundreds of Barrels |
| M$ - | Millions of Dollars | TBPD - | Thousand of Barrels per Day |
| B$ - | Billions of Dollars | MCF - | Thousand of Cubic Feet |
| GL - | Gallons | HMCF - | Hundreds of MCF Per Day |
| TGL - | Thousands of Gallons | MMCFD - | Million Cubic Feet Per Day |

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